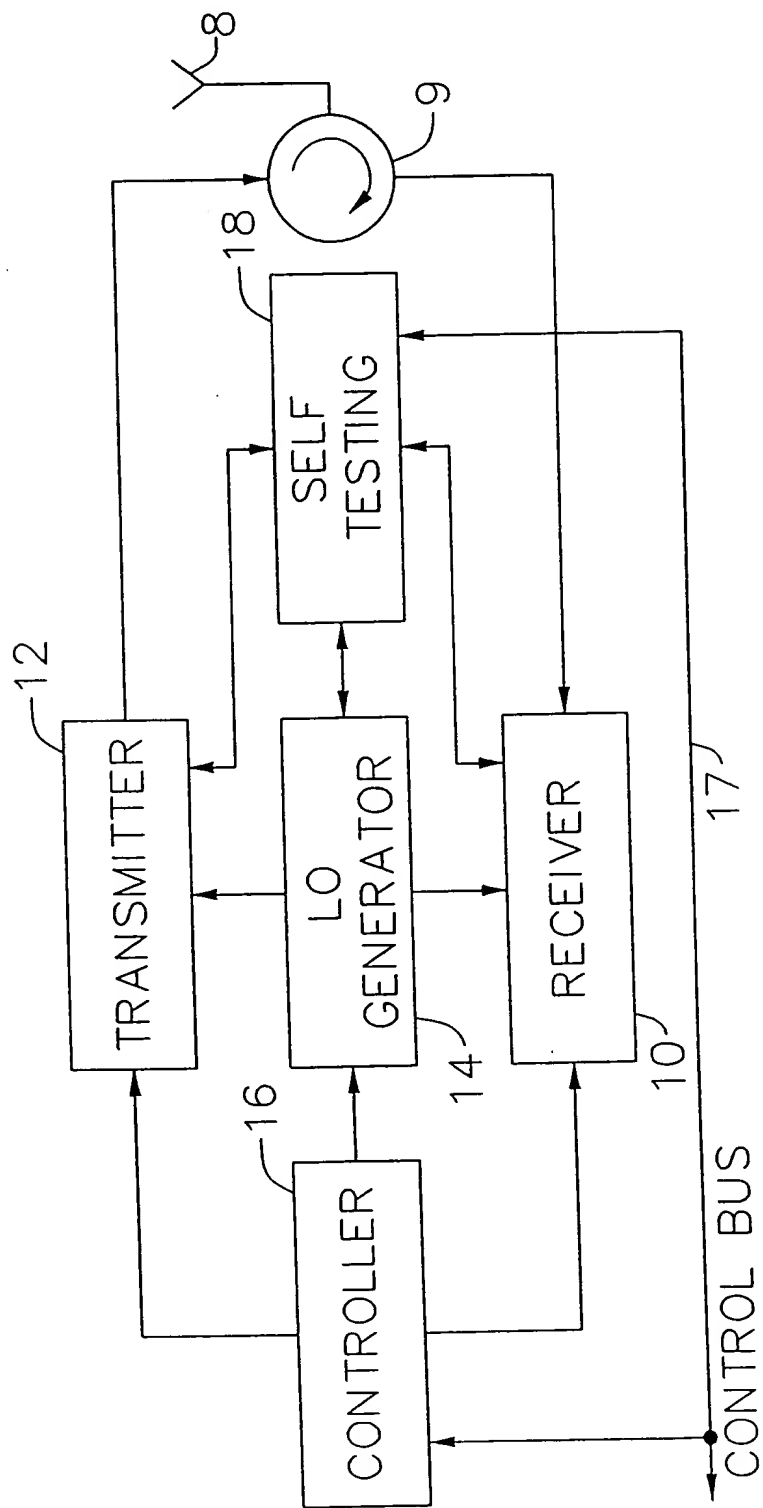
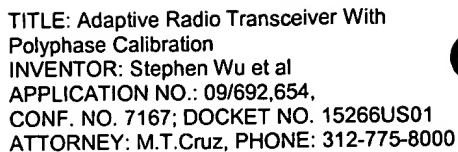




TITLE: Adaptive Radio Transceiver With  
Phase Calibration  
INVENTOR: Stephen Wu et al.  
APPLICATION NO.: 09/692,654,  
CONF. NO. 7167; DOCKET NO. 15266US01  
ATTORNEY: M.T.Cruz, PHONE: 312-775-8000

FIG. 1





The diagram illustrates a programmable multi-stage amplifier system, divided into three main functional blocks: a receiver section (top), a calibration and reference section (middle), and a transmitter section (bottom).

**Receiver Section (10):** This section processes an RF input signal. It starts with an RF input connected to an LNA (Low Noise Amplifier, 22). The output of the LNA is connected to a SELECT GAIN block (24). The SELECT GAIN block has two outputs, Q CLK (26) and I CLK (26), which are connected to two mixers (represented by circles with an 'X'). The outputs of these mixers are connected to a COMPLEX BPF (Complex Baseband Filter, 28). The output of the COMPLEX BPF is connected to a PROGRAMMABLE MULTIPLE STAGE AMP (30). The output of the PROGRAMMABLE MULTIPLE STAGE AMP is connected to a FBASE block (32). The output of the FBASE block is connected to a PASSIVE POLY-PHASE LPF (Passive Poly-Phase Low Pass Filter, 34). The output of the PASSIVE POLY-PHASE LPF is connected to a DEMODULATOR (36). The DEMODULATOR has two outputs, one connected to an A/D (Analog-to-Digital) converter (34) and another connected to a PROGRAM input (36).

**Calibration and Reference Section (14):** This section provides calibration and reference signals. It includes an IQ MIXER (52) with an I/Q input (53). The IQ MIXER is connected to an I/Q LO (I/Q Local Oscillator, 48). The I/Q LO is connected to a SELECT input (43). The SELECT input is connected to a phase shifter (45) and a phase detector (46). The phase shifter (45) is connected to a DIVIDE/N block (50). The phase detector (46) is connected to a CLK. GEN. (Clock Generator, 41). The CLK. GEN. is connected to a DIVIDE/n block (42). The DIVIDE/n block is connected to a DIVIDE/L block (40). The DIVIDE/L block is connected to a CRYSTAL OSCILLATOR (38). The CRYSTAL OSCILLATOR has a FREF. (Frequency Reference) input. The output of the CRYSTAL OSCILLATOR is connected to a PROGRAM input (40).

**Transmitter Section (12):** This section generates a calibrated signal. It starts with a PROGRAMMABLE LPF (Programmable Low Pass Filter, 56). The output of the PROGRAMMABLE LPF is connected to a PA (Power Amplifier, 62). The PA is connected to an AMP (Amplifier, 60). The output of the AMP is connected to a CONTROL input (62). The PROGRAMMABLE LPF has two inputs, I CLK (58) and Q CLK (58), which are connected to two mixers (represented by circles with an 'X'). The outputs of these mixers are connected to a BUFFER (54) and a PROGRAM input (54). The BUFFER (54) is connected to an INI (Initial) input. The PROGRAM input (54) is connected to a PROGRAM input (54).

The system is controlled by PROGRAM and CALIBRATION signals, which are connected to various components throughout the system.



FIG. 3

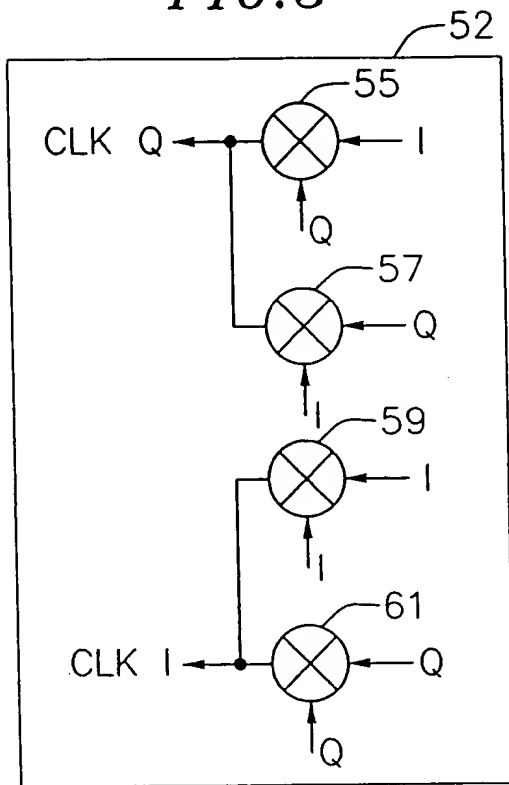
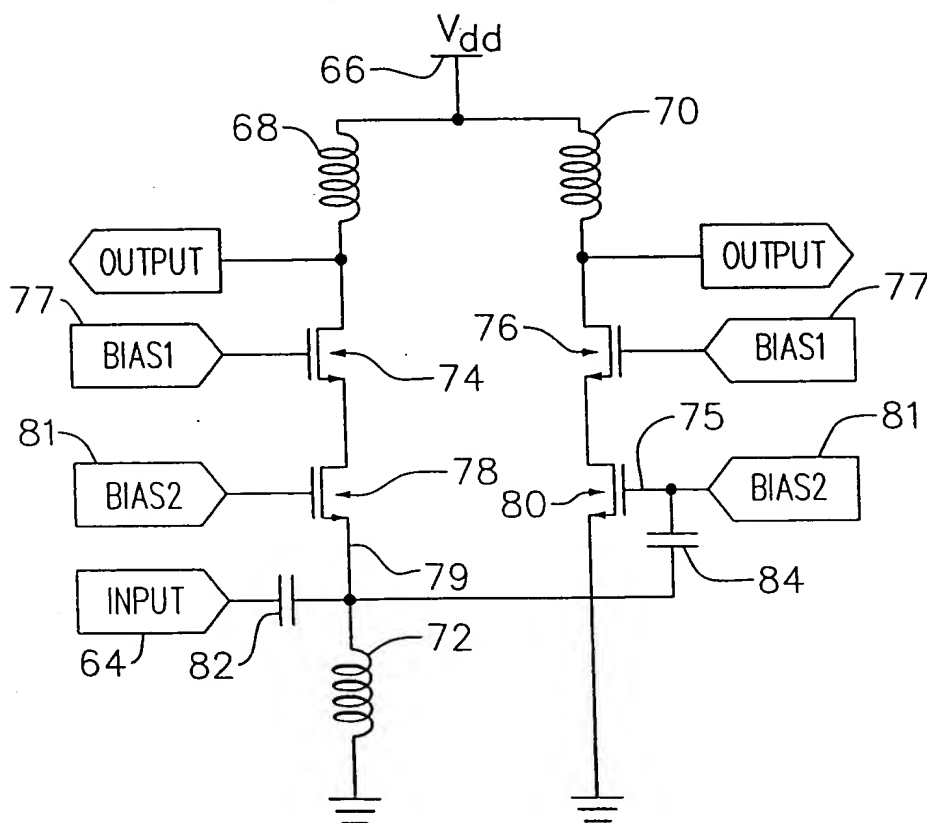


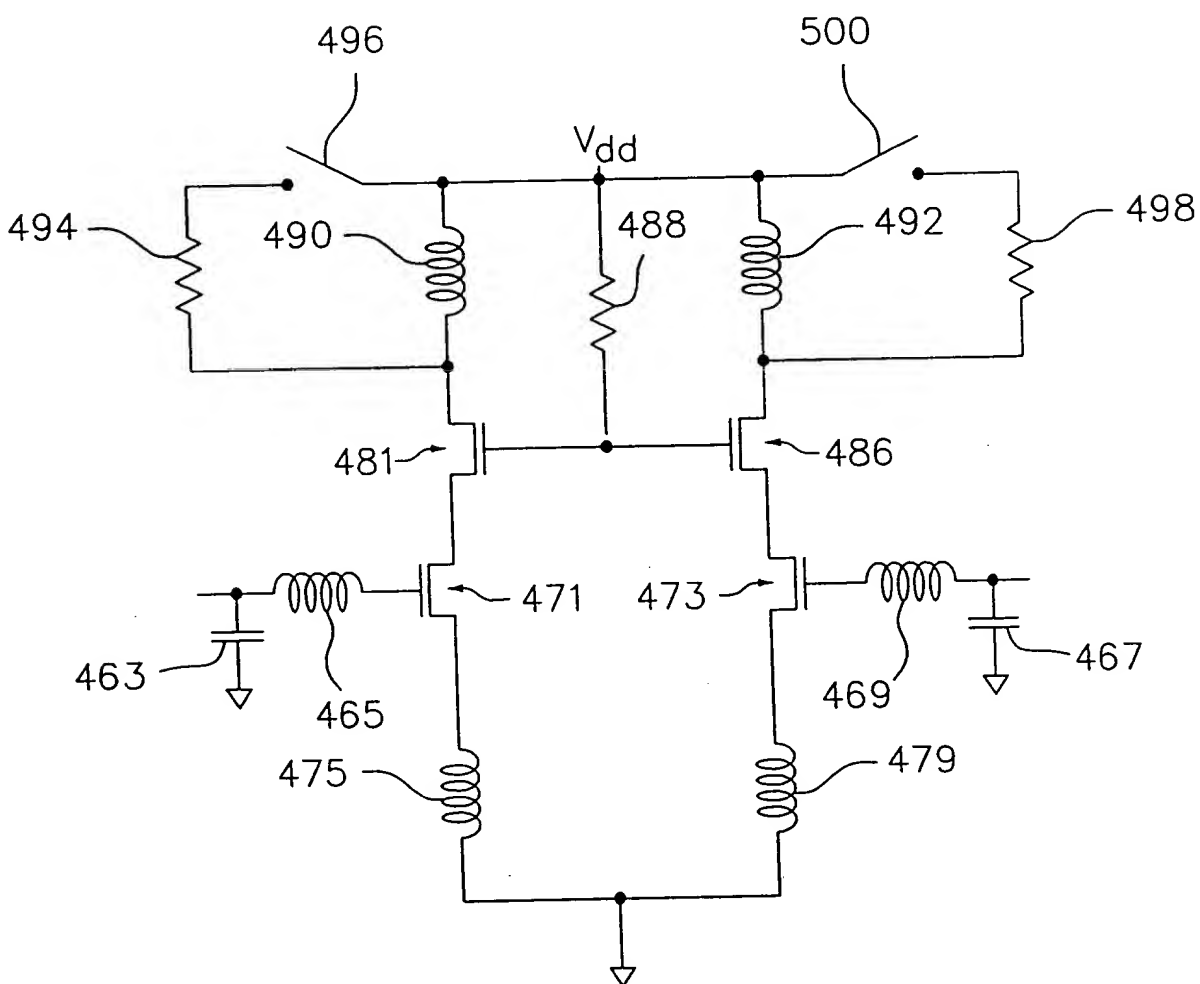
FIG. 4

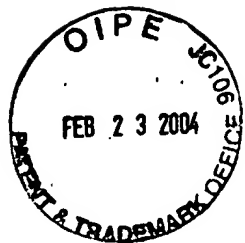




TITLE: Adaptive Radio Transceiver With  
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*FIG. 4(a)*





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FIG. 5

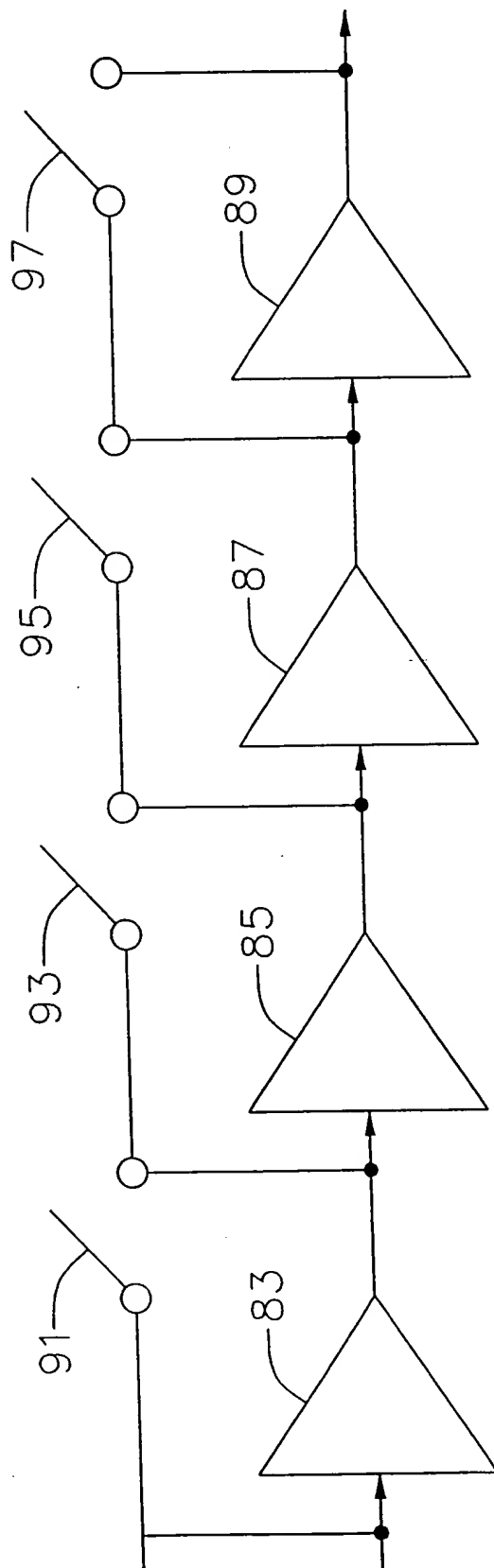
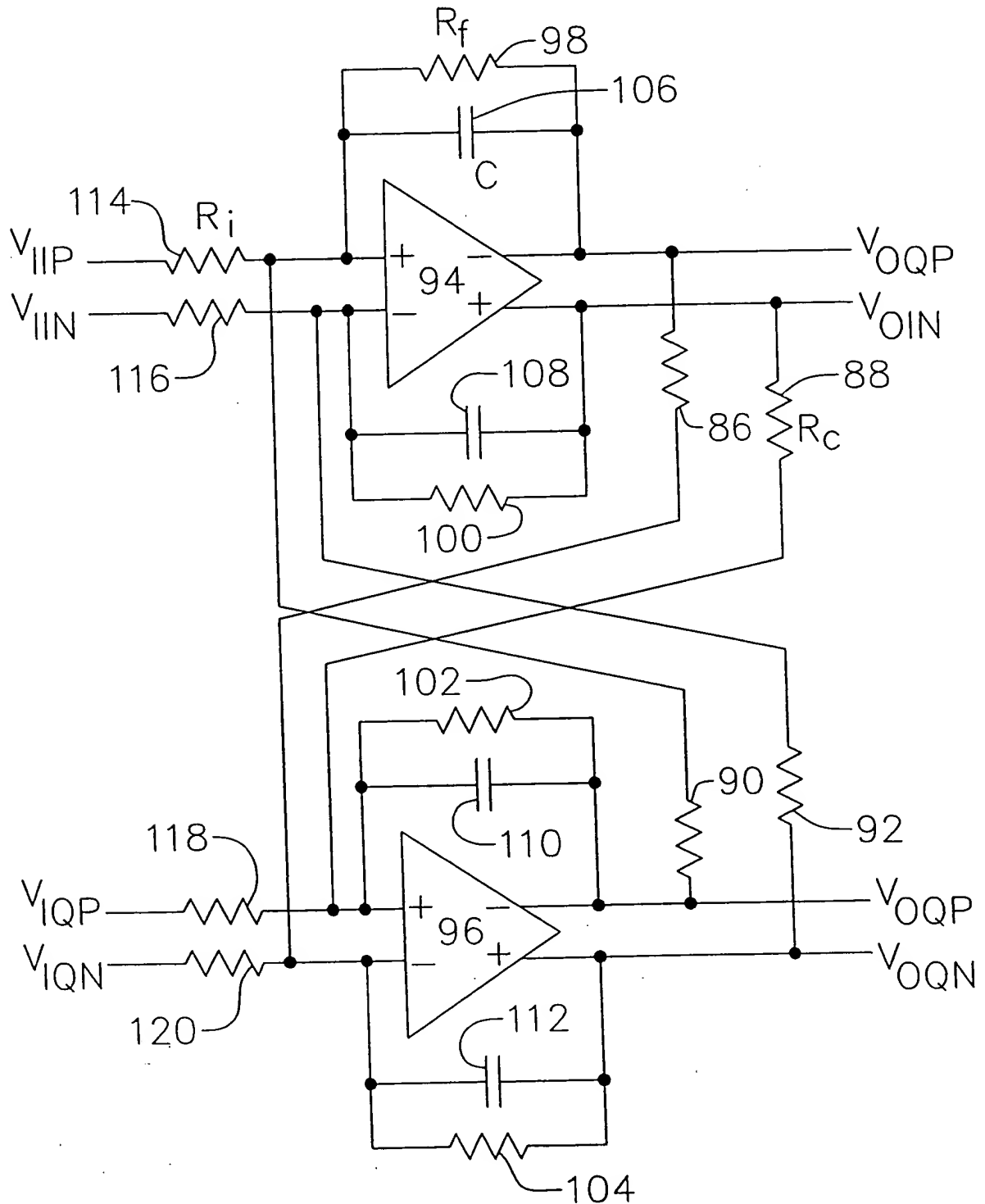


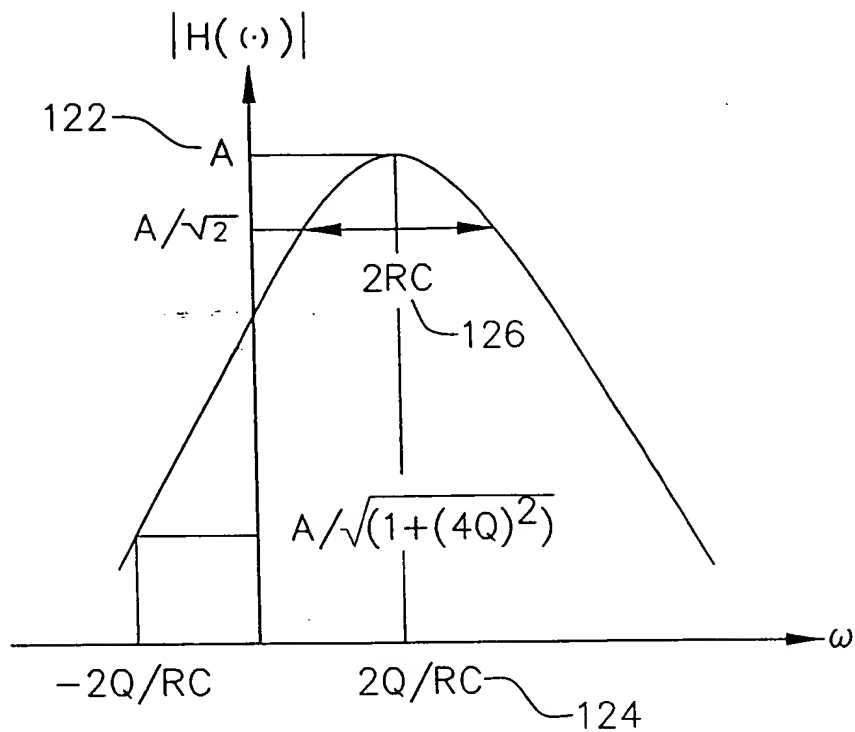


FIG. 6

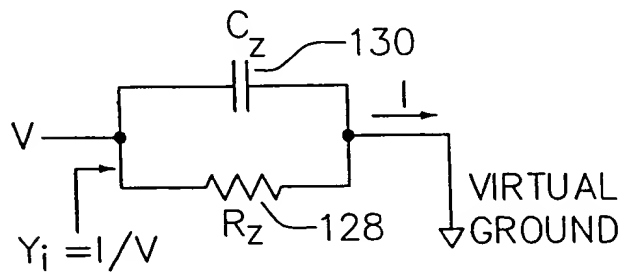




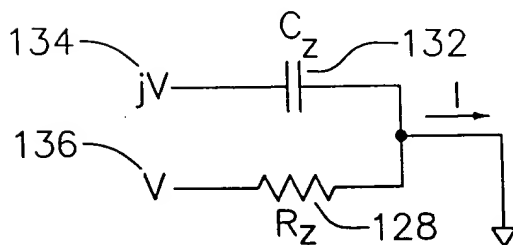
**FIG. 7**

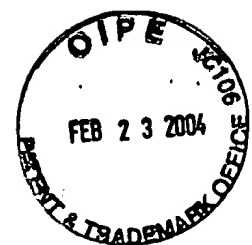


**FIG. 8**



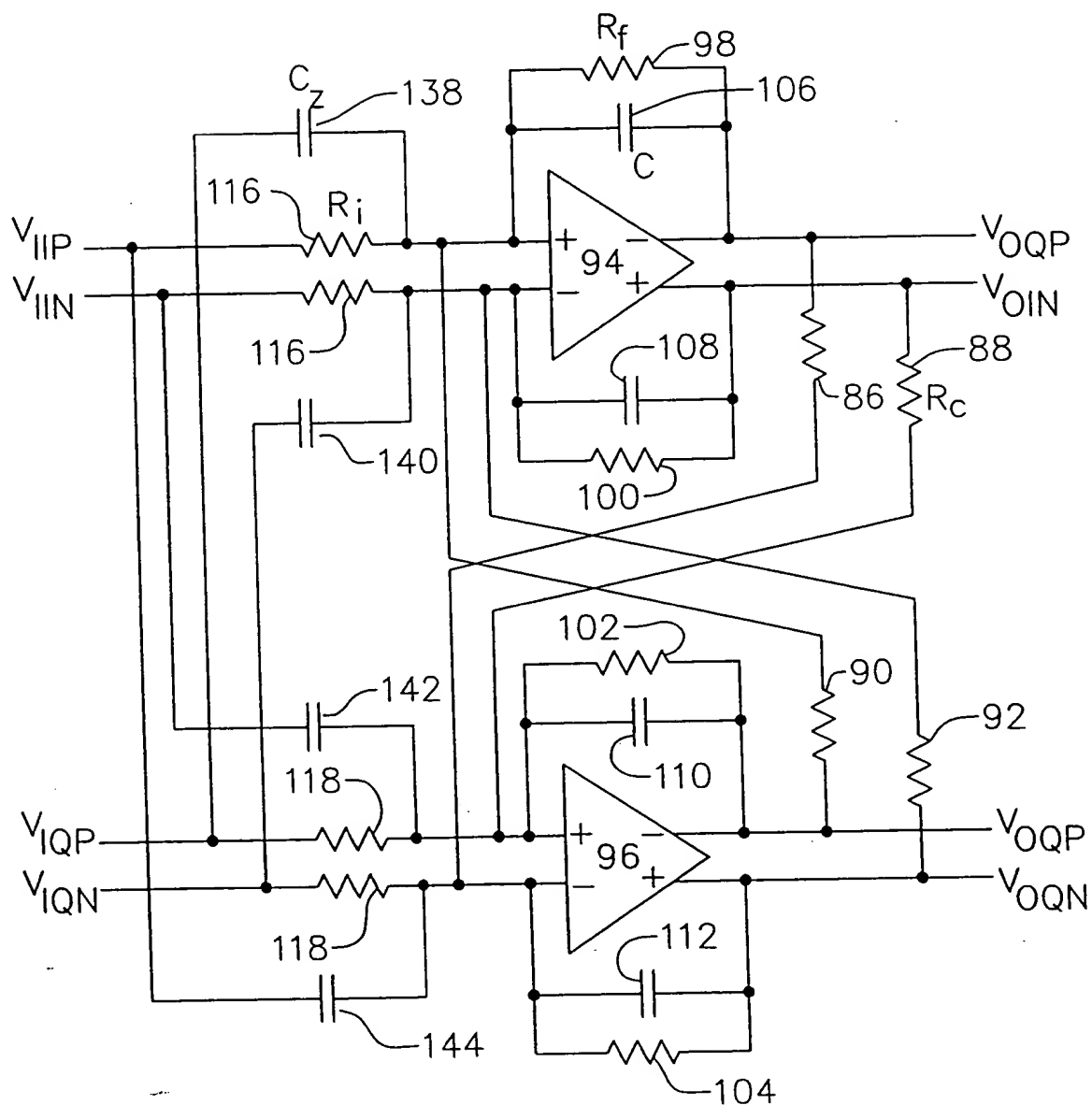
**FIG. 9**





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INVENTOR: Stephen Wu et al  
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FIG. 10

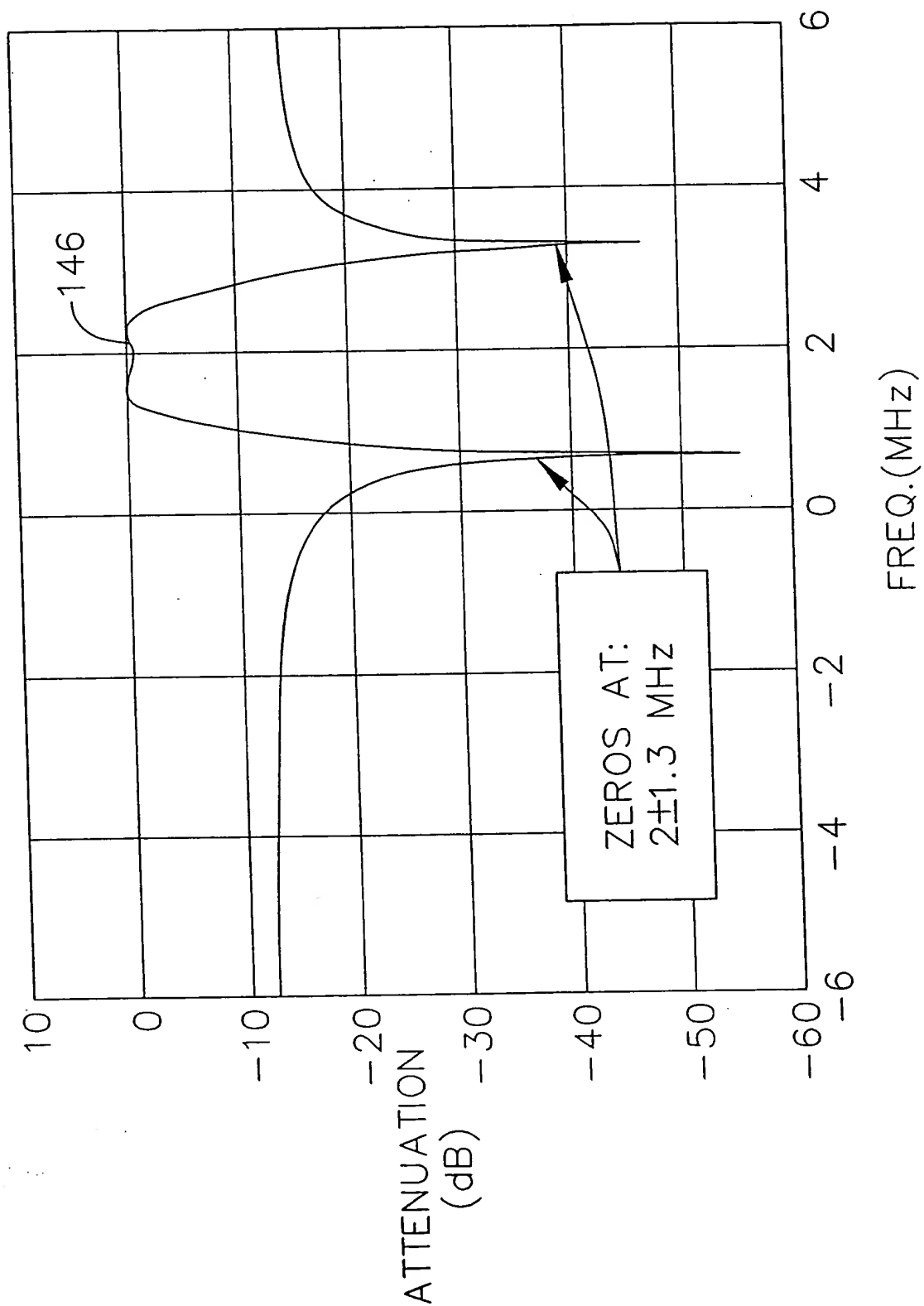






TITLE: Adaptive Radio Transceiver With  
Polyphase Calibration  
INVENTOR: Stephen Wu et al  
APPLICATION NO.: 09/692,654,  
CONF. NO. 7167; DOCKET NO. 15266US01  
ATTORNEY: M.T.Cruz, PHONE: 312-775-8000

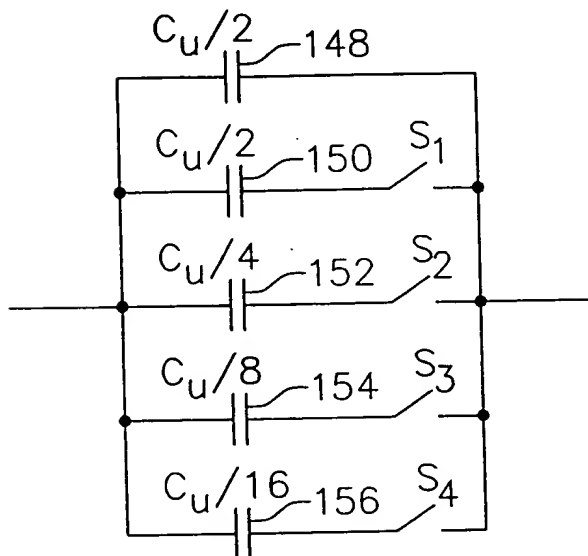
FIG. 11



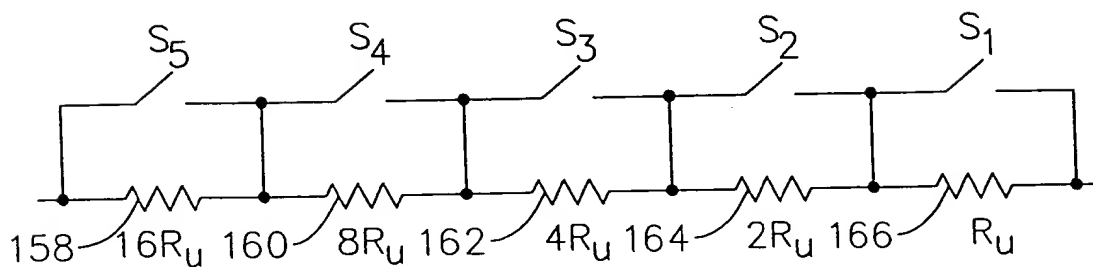


TITLE: Adaptive Radio Transceiver With Polyphase  
Calibration  
INVENTOR: Stephen Wu et al  
APPLICATION NO.: 09/692,654,  
CONF. NO. 7167; DOCKET NO. 15266US01  
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*FIG. 12(a)*



*FIG. 12(b)*



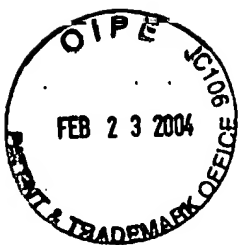


FIG. 13

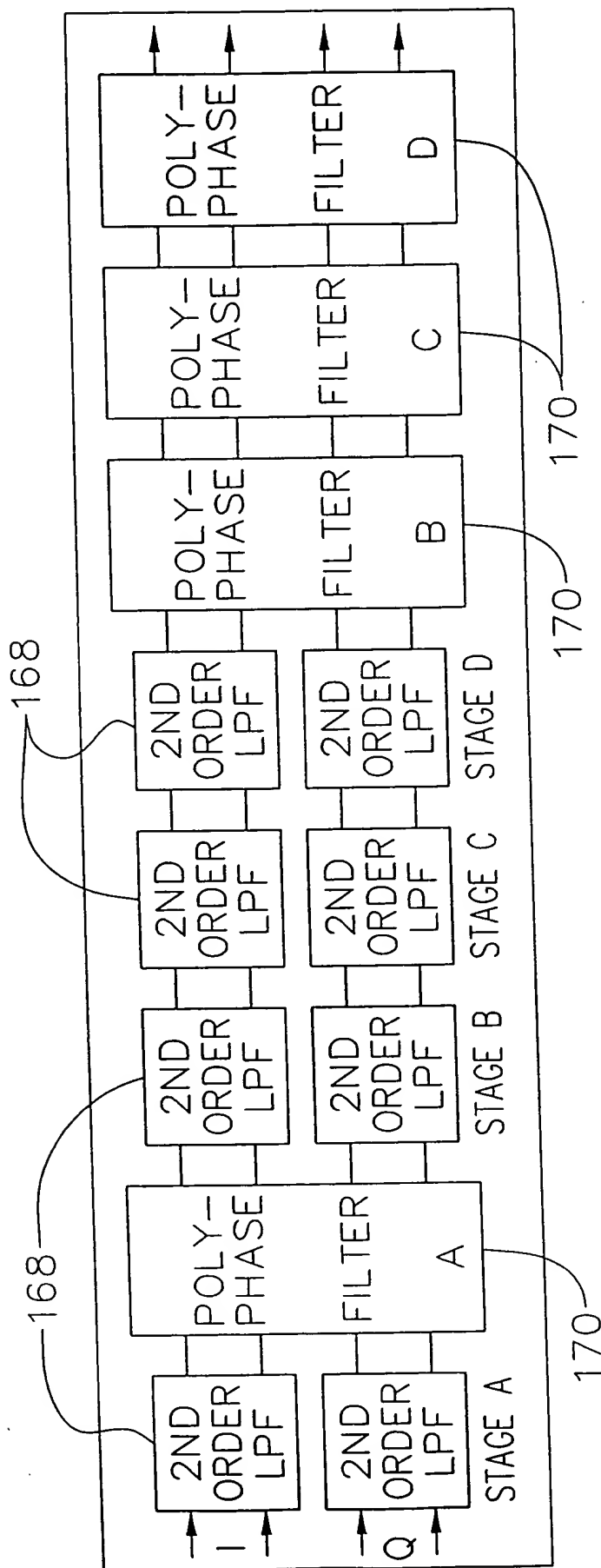
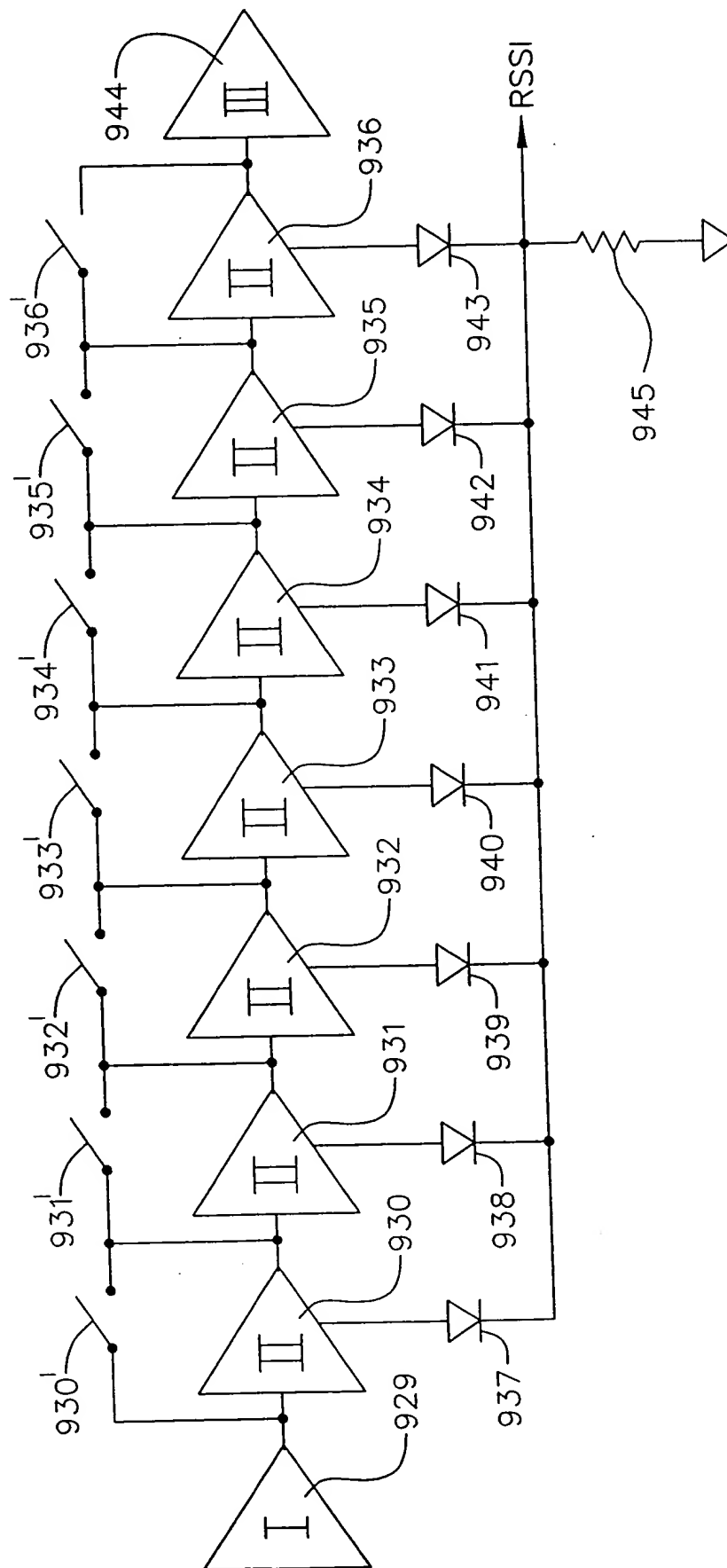




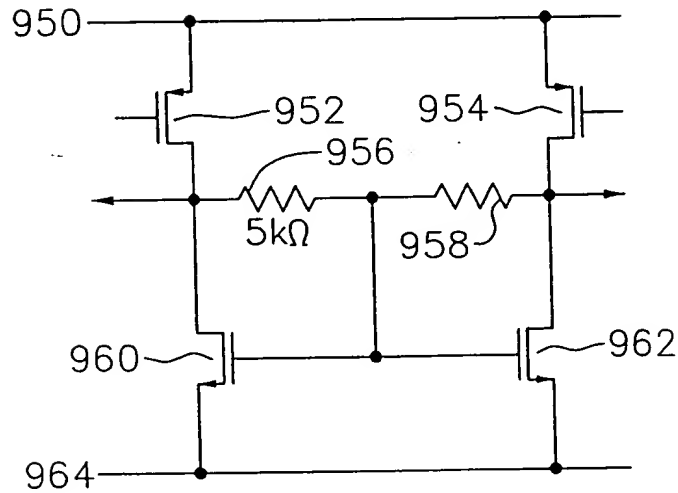
FIG. 14



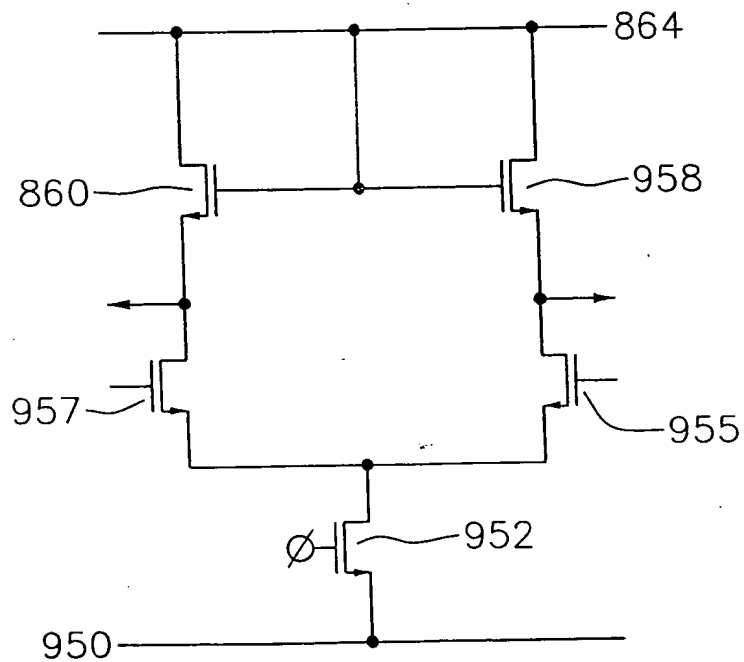


TITLE: Adaptive Radio Transceiver With Polyphase  
Invention  
INVENTOR: Stephen Wu et al  
APPLICATION NO.: 09/692,654,  
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*FIG. 15*



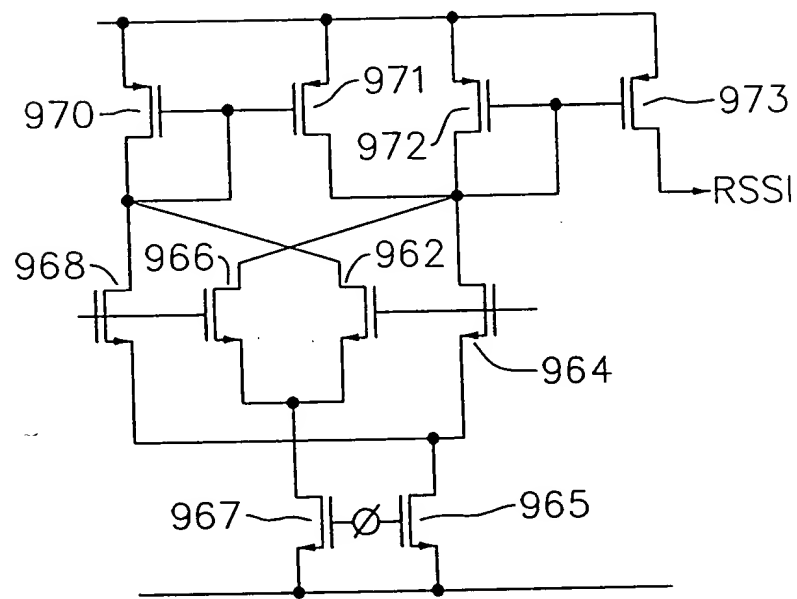
*FIG. 16(a)*





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Operation  
INVENTOR: Stephen Wu et al  
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*FIG. 16(b)*



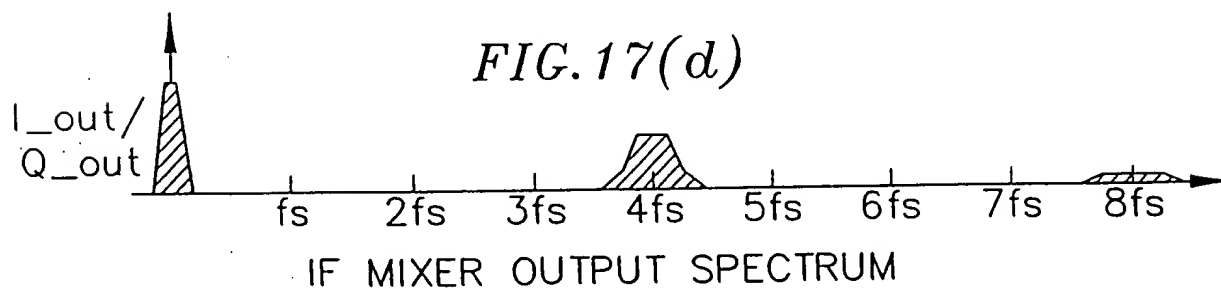
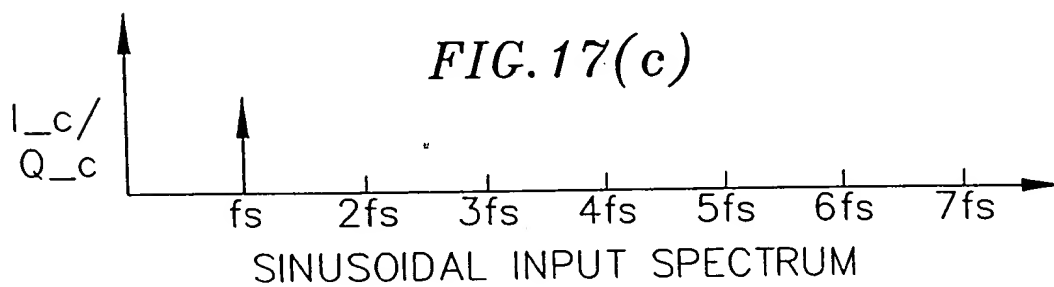
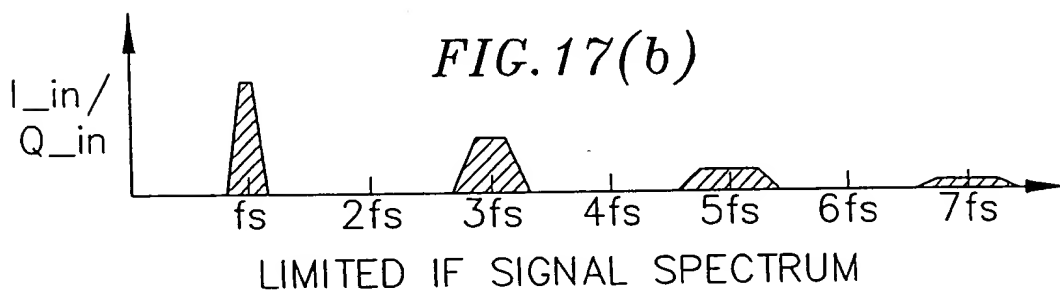
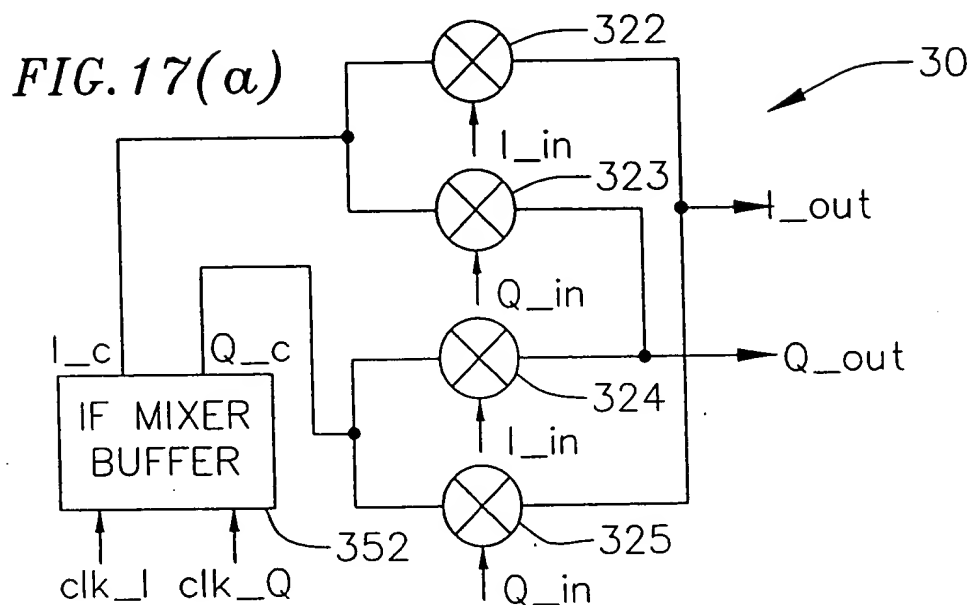




FIG. 18

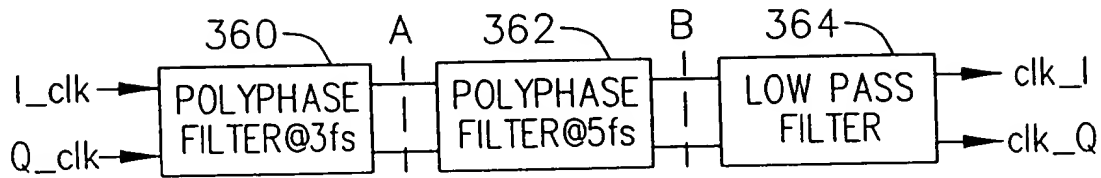


FIG. 19(a)

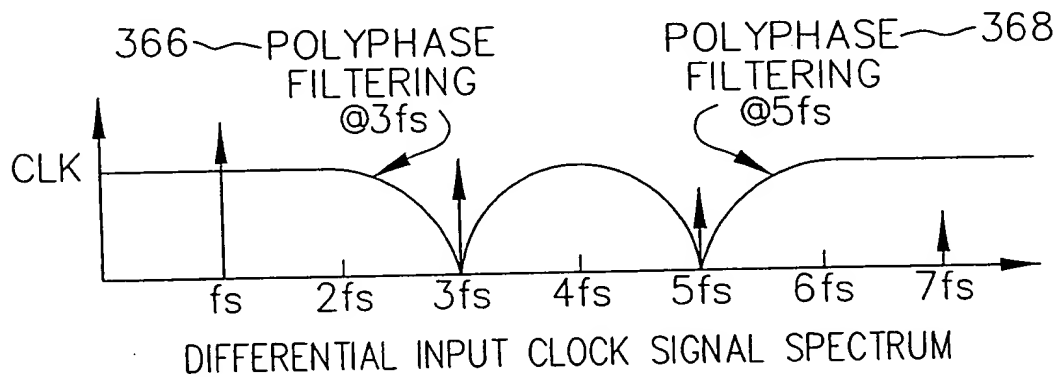


FIG. 19(b)

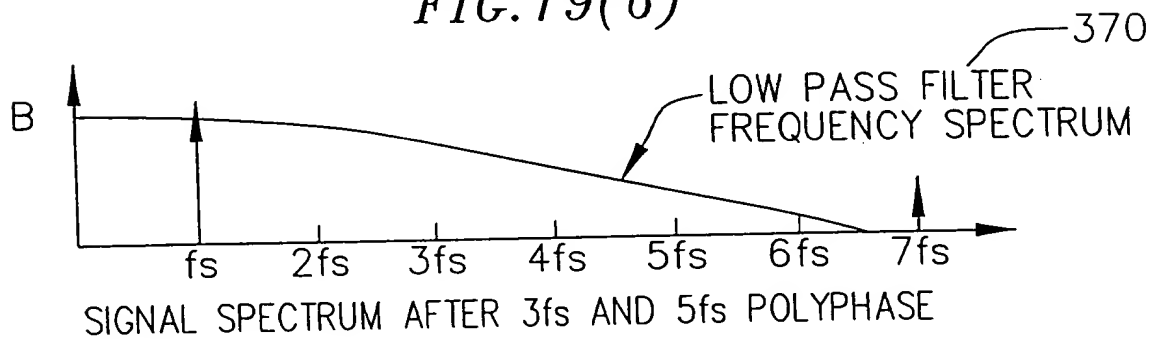
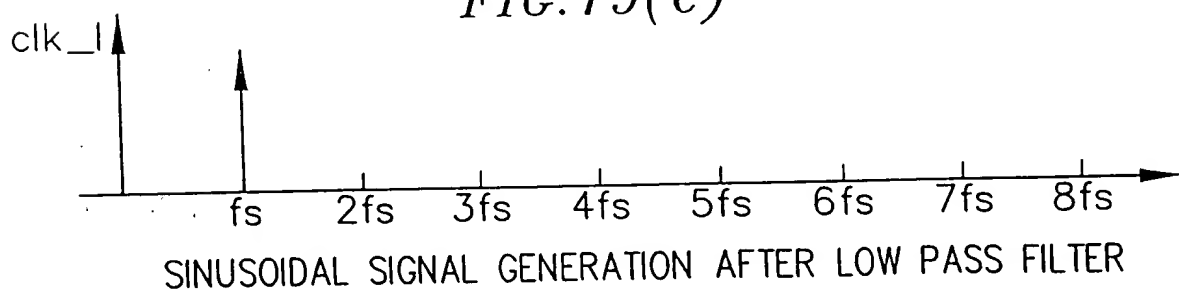


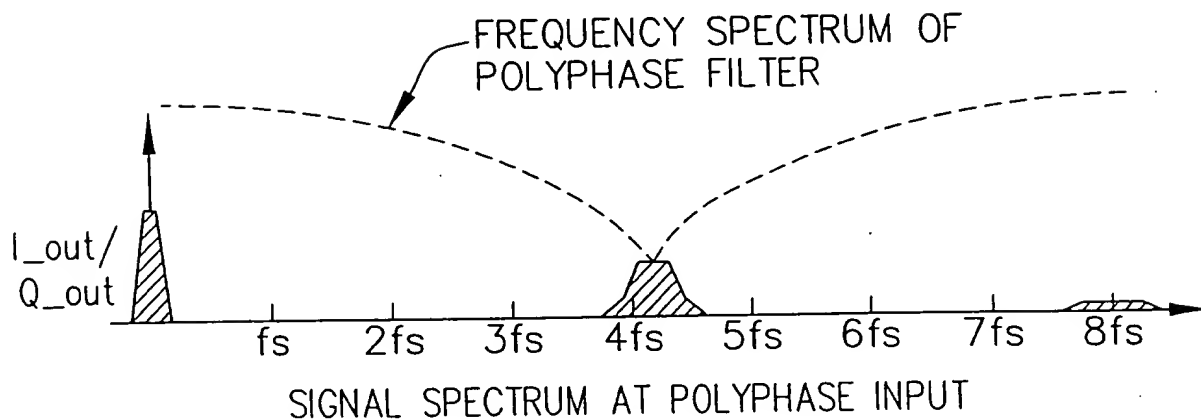
FIG. 19(c)



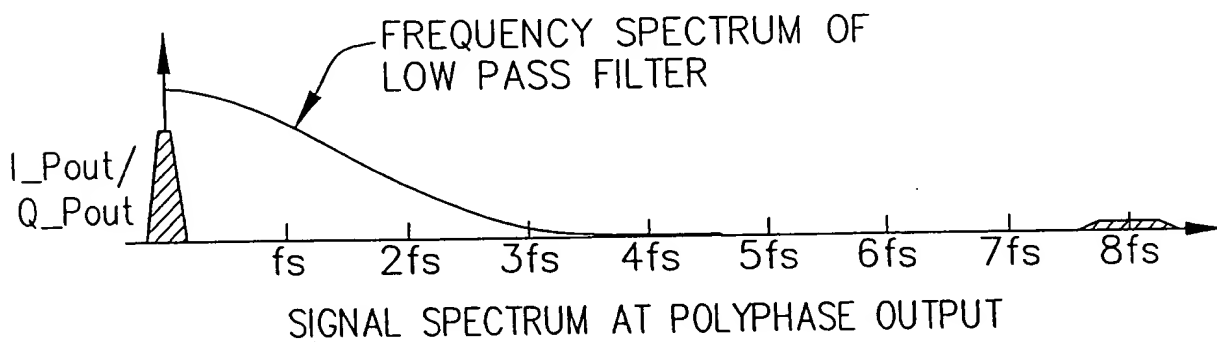




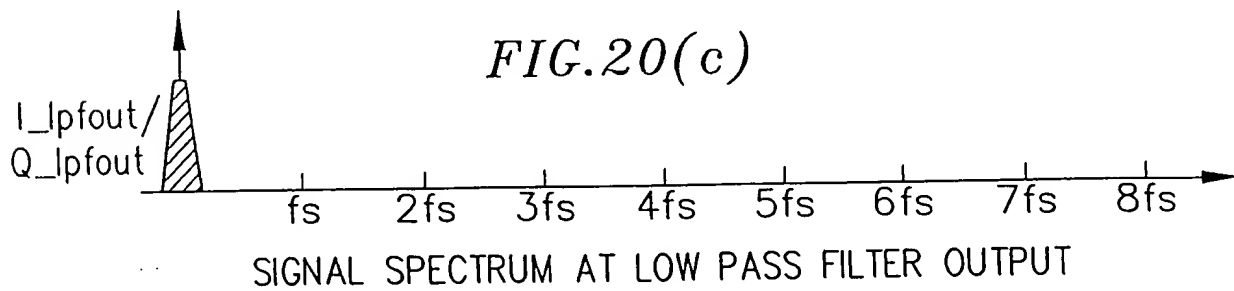
*FIG.20(a)*

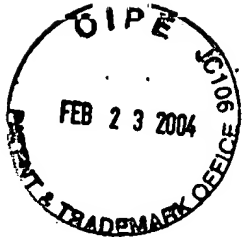


*FIG.20(b)*



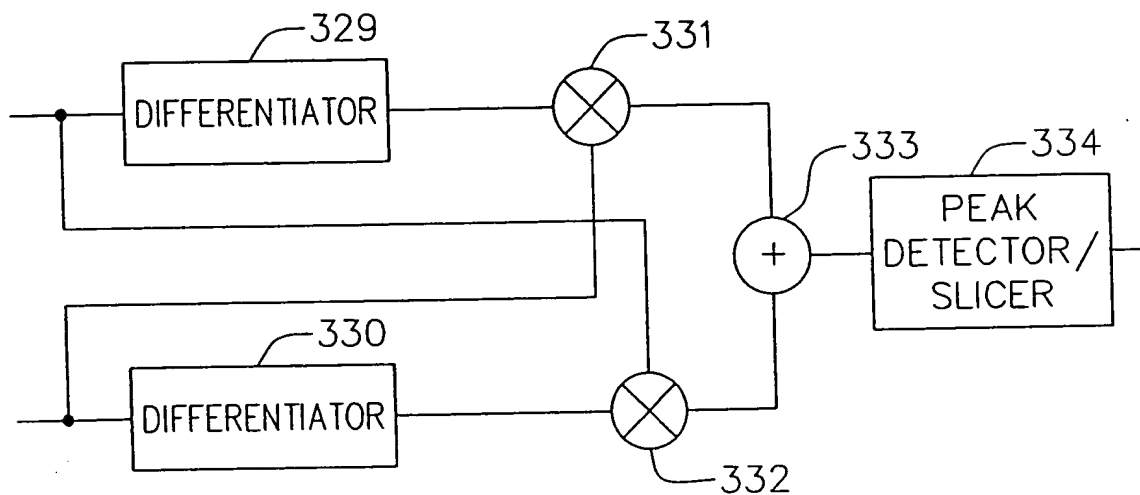
*FIG.20(c)*



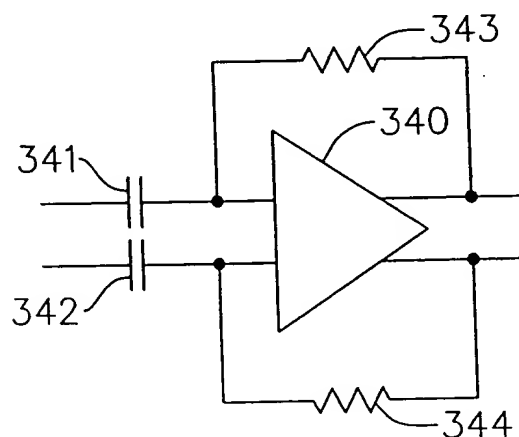


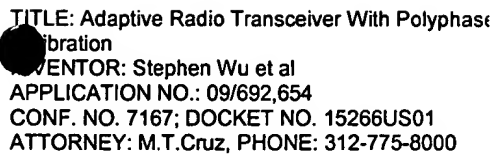
TITLE: Adaptive Radio Transceiver With Polyphase  
Invention  
INVENTOR: Stephen Wu et al  
APPLICATION NO.: 09/692,654,  
CONF. NO. 7167; DOCKET NO. 15266US01  
ATTORNEY: M.T.Cruz, PHONE: 312-775-8000

*FIG. 21*



*FIG. 22*



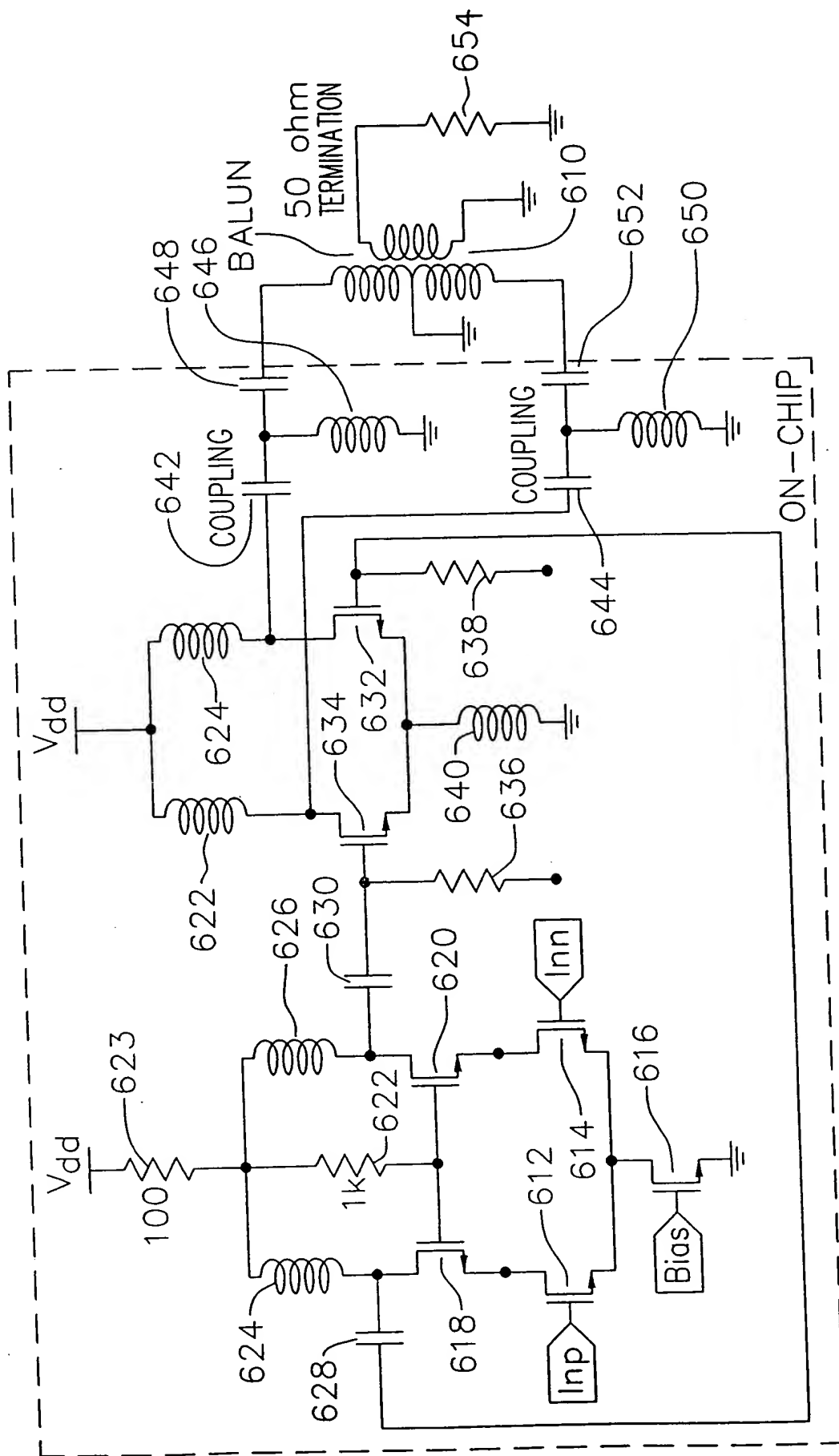


The diagram shows a differential signal processing circuit. Two input signals are fed into a differential amplifier (345). The outputs of the amplifier are connected to two inverters (350). A feedback network is connected between the outputs of the inverters and the inputs of the differential amplifier. This network consists of two resistors (348 and 349) in series, with two peak detectors (346 and 347) connected in parallel across them. The peak detectors are connected to the inputs of the differential amplifier.



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FIG. 25



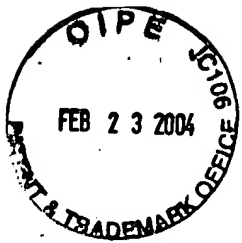


FIG.26(a)

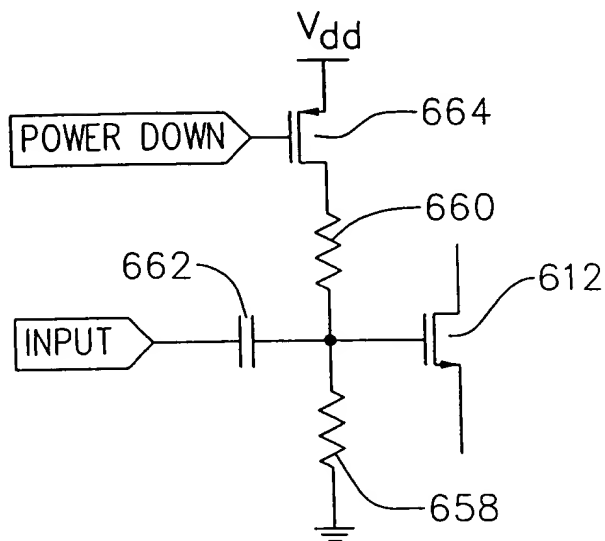


FIG.26(b)

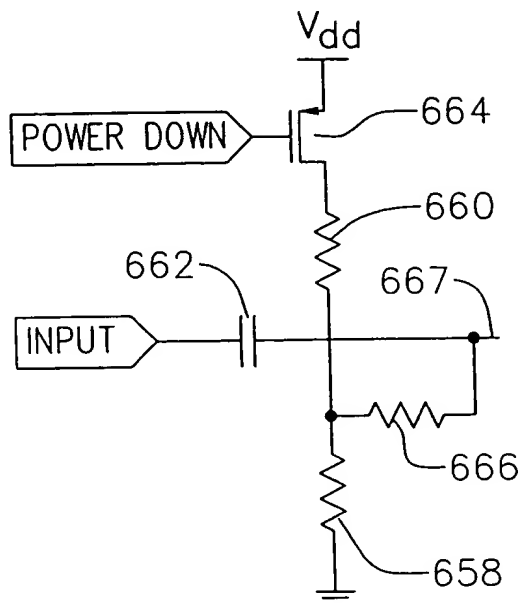


FIG.27

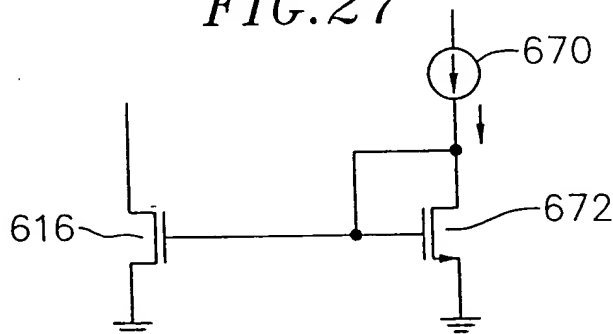
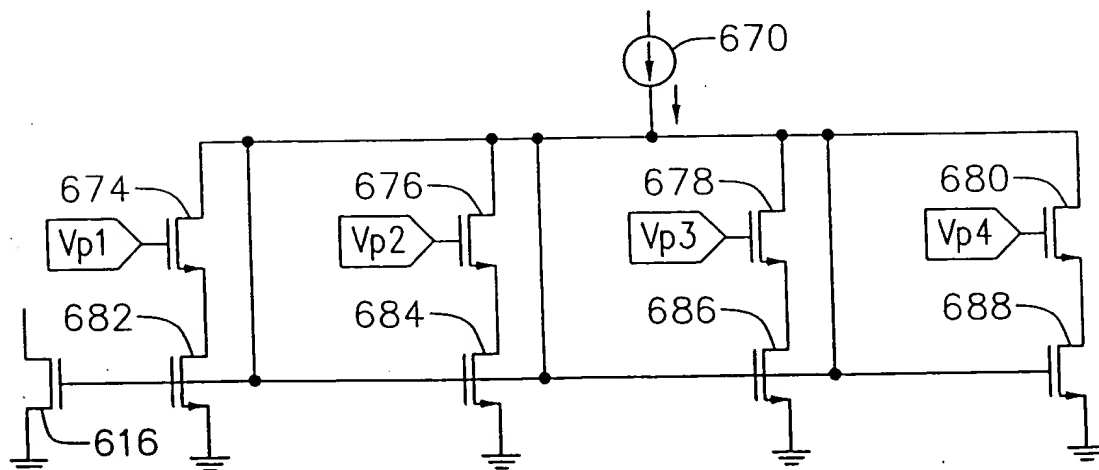


FIG.28



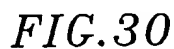
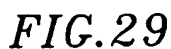




FIG.31(a)

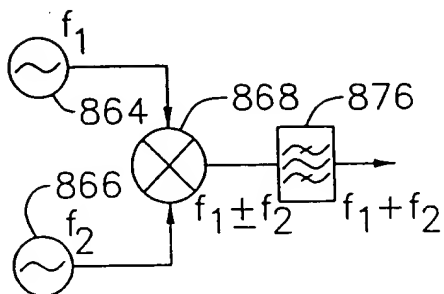


FIG.31(b)

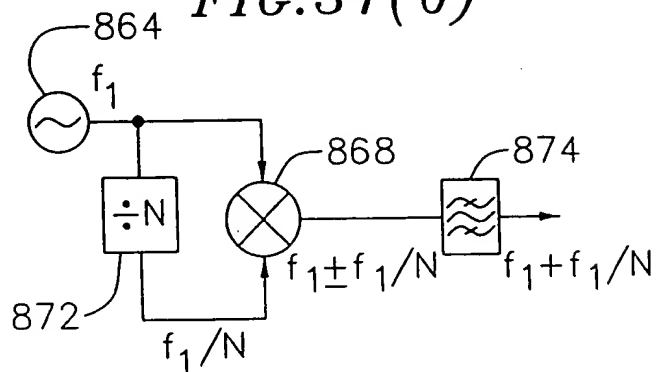


FIG.32

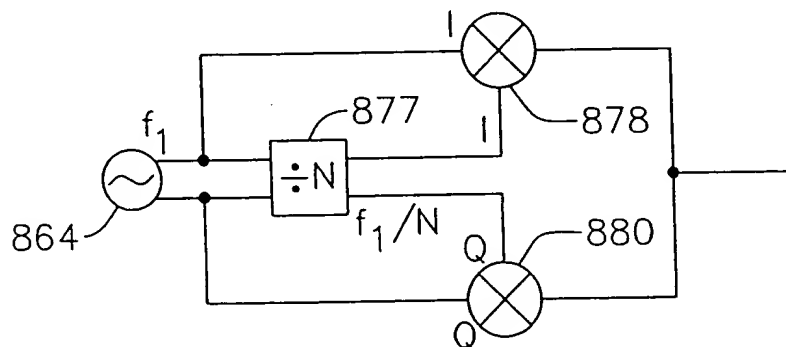


FIG.33

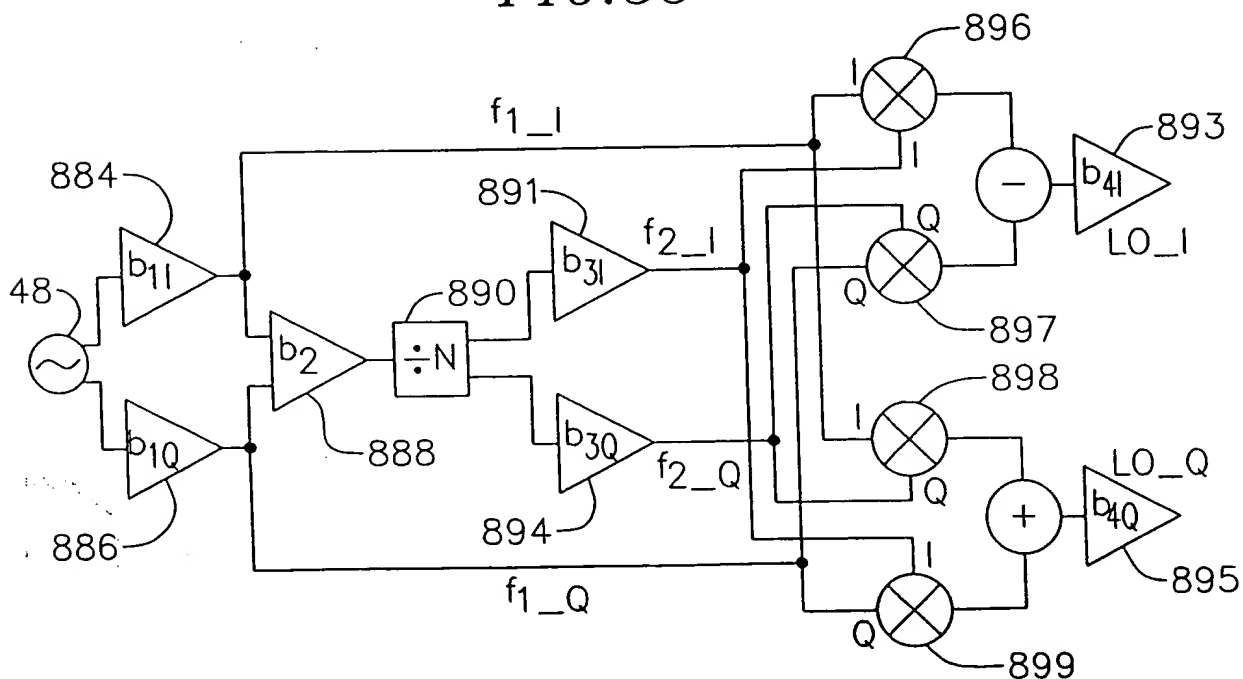




FIG.33( $\alpha$ )

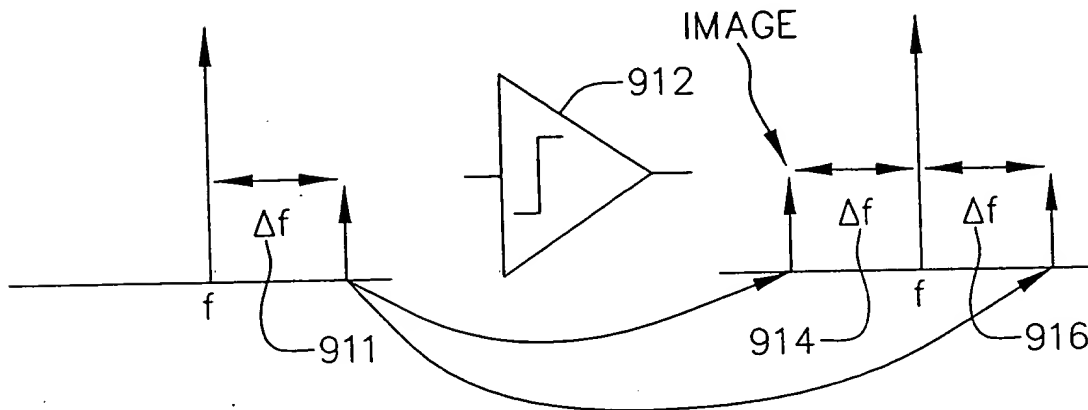
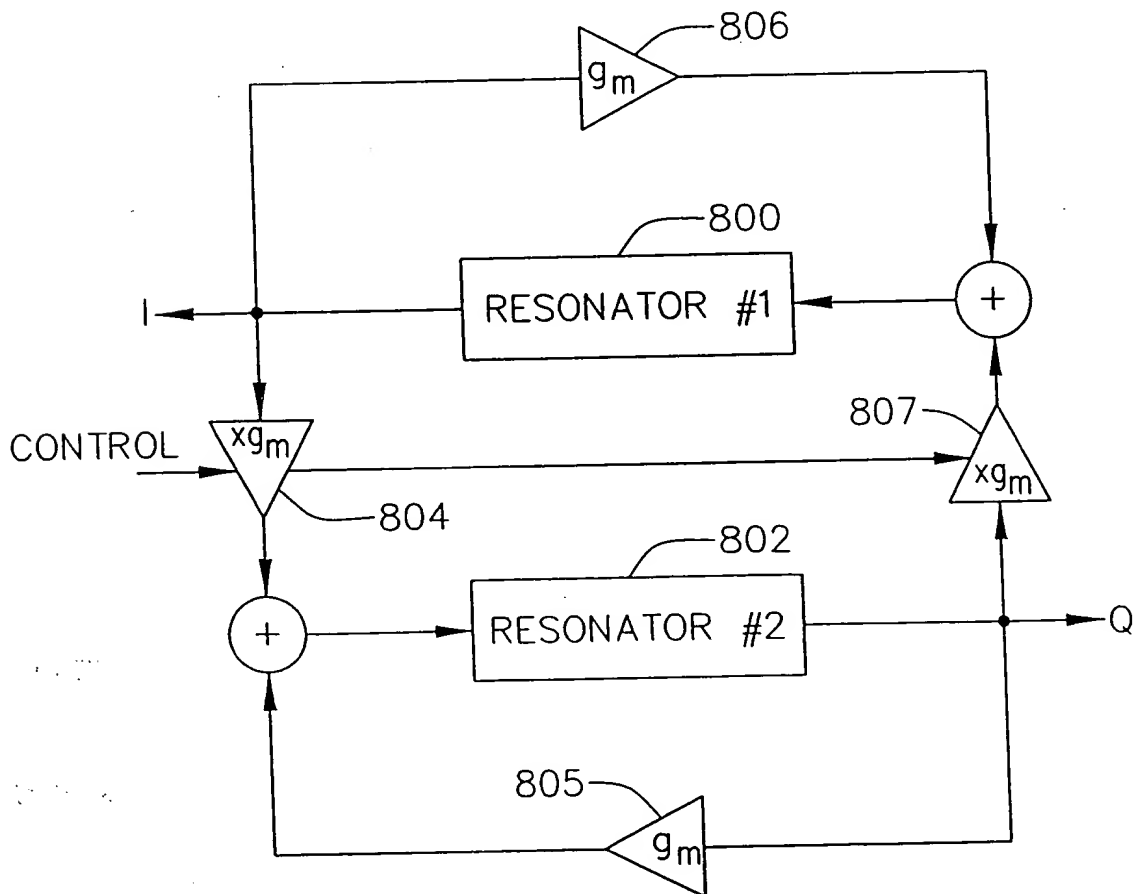


FIG.34

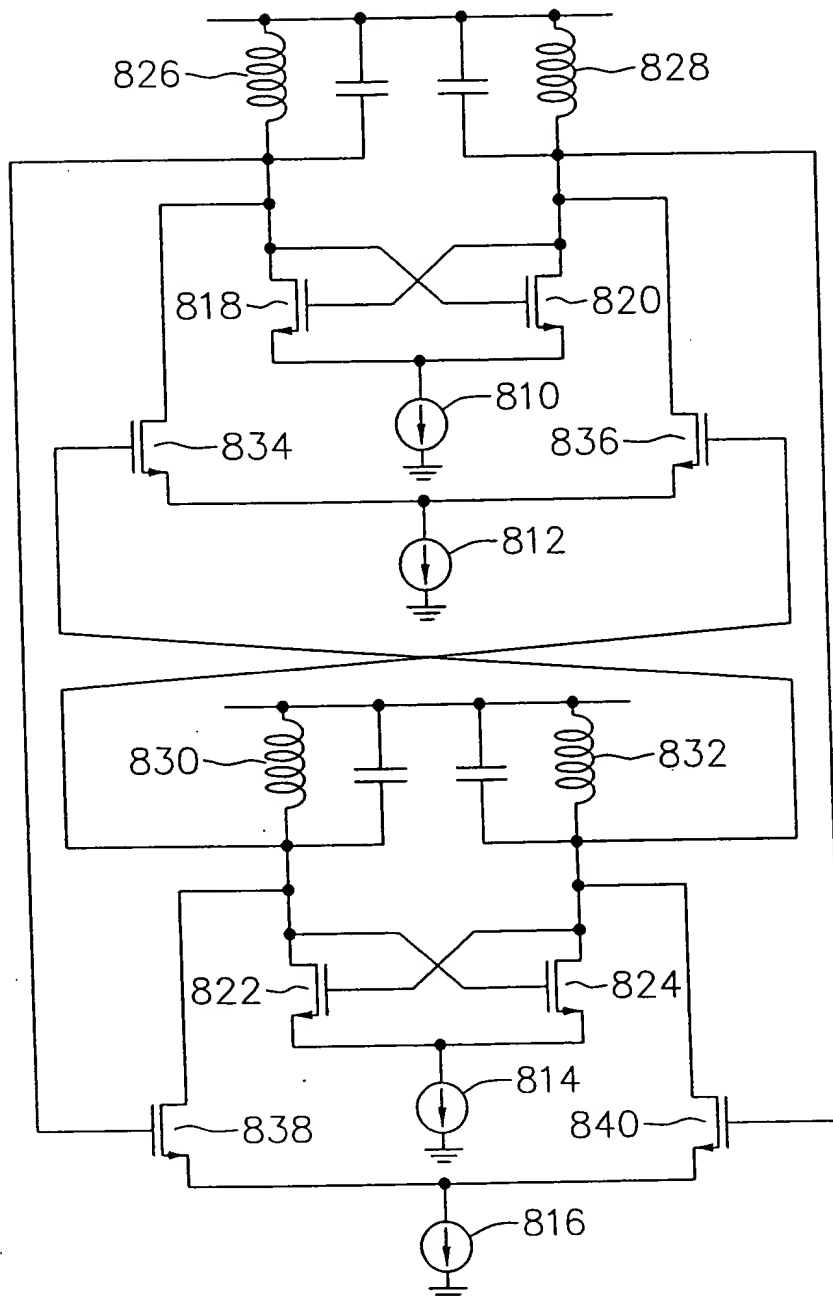






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*FIG. 35*





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ATTORNEY: M.T.Cruz, PHONE: 312-775-8000

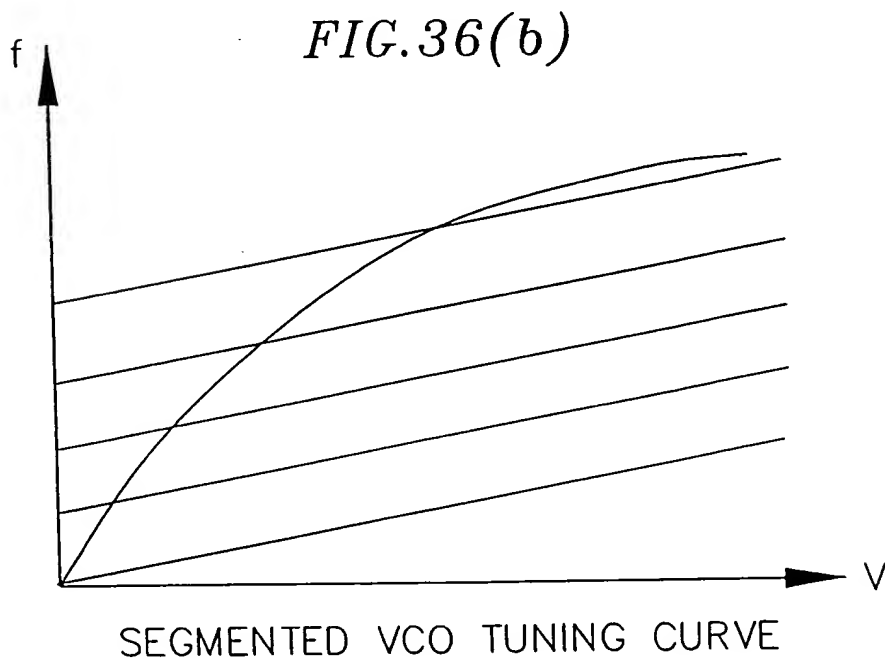
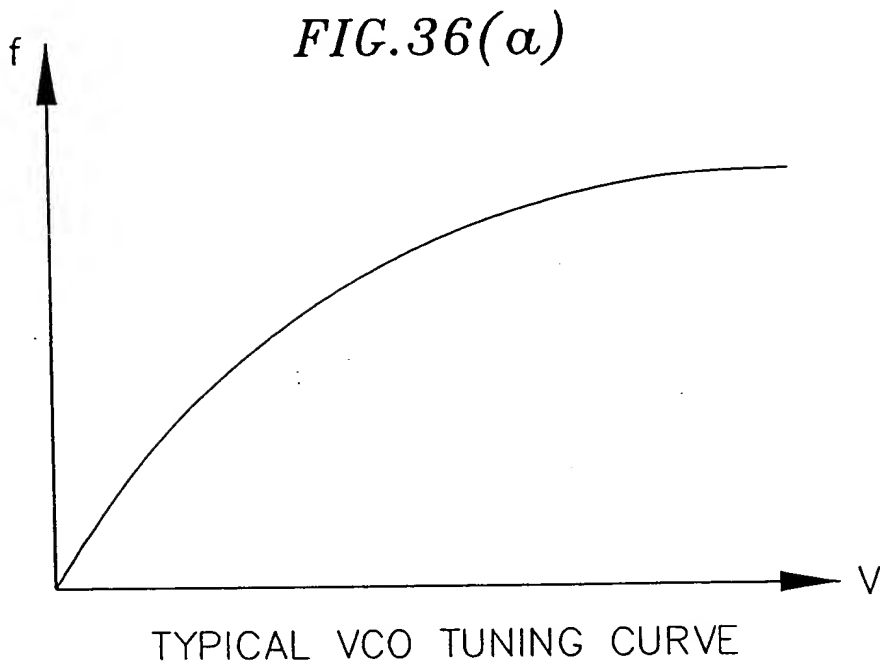




FIG.37(a)

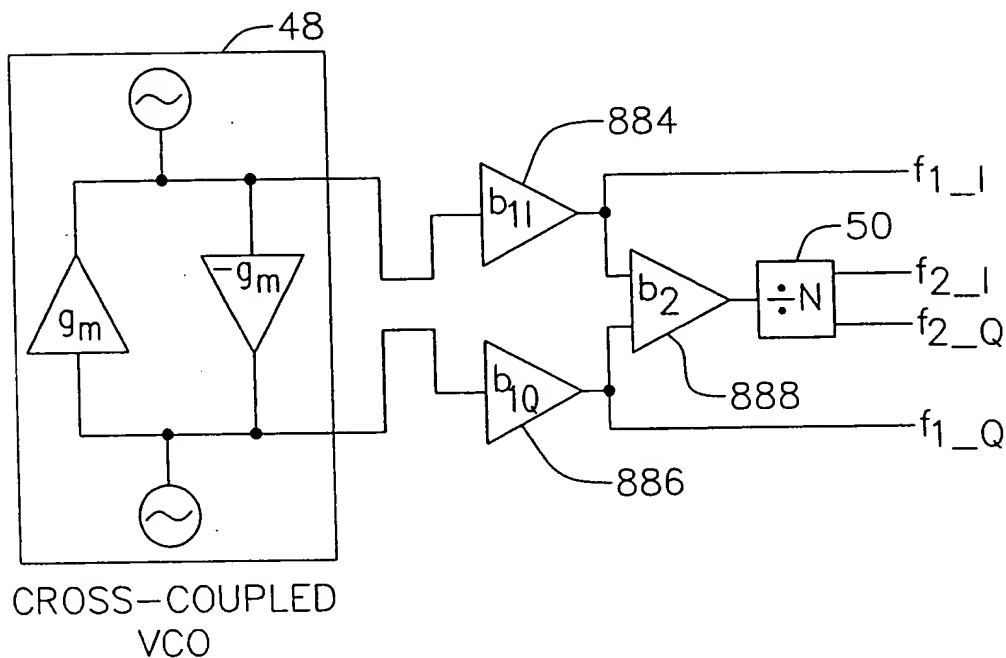


FIG.37(b)

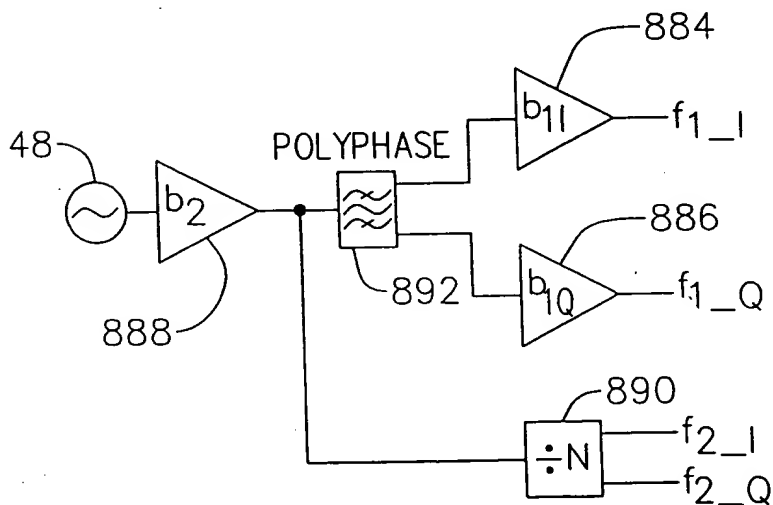




FIG.38

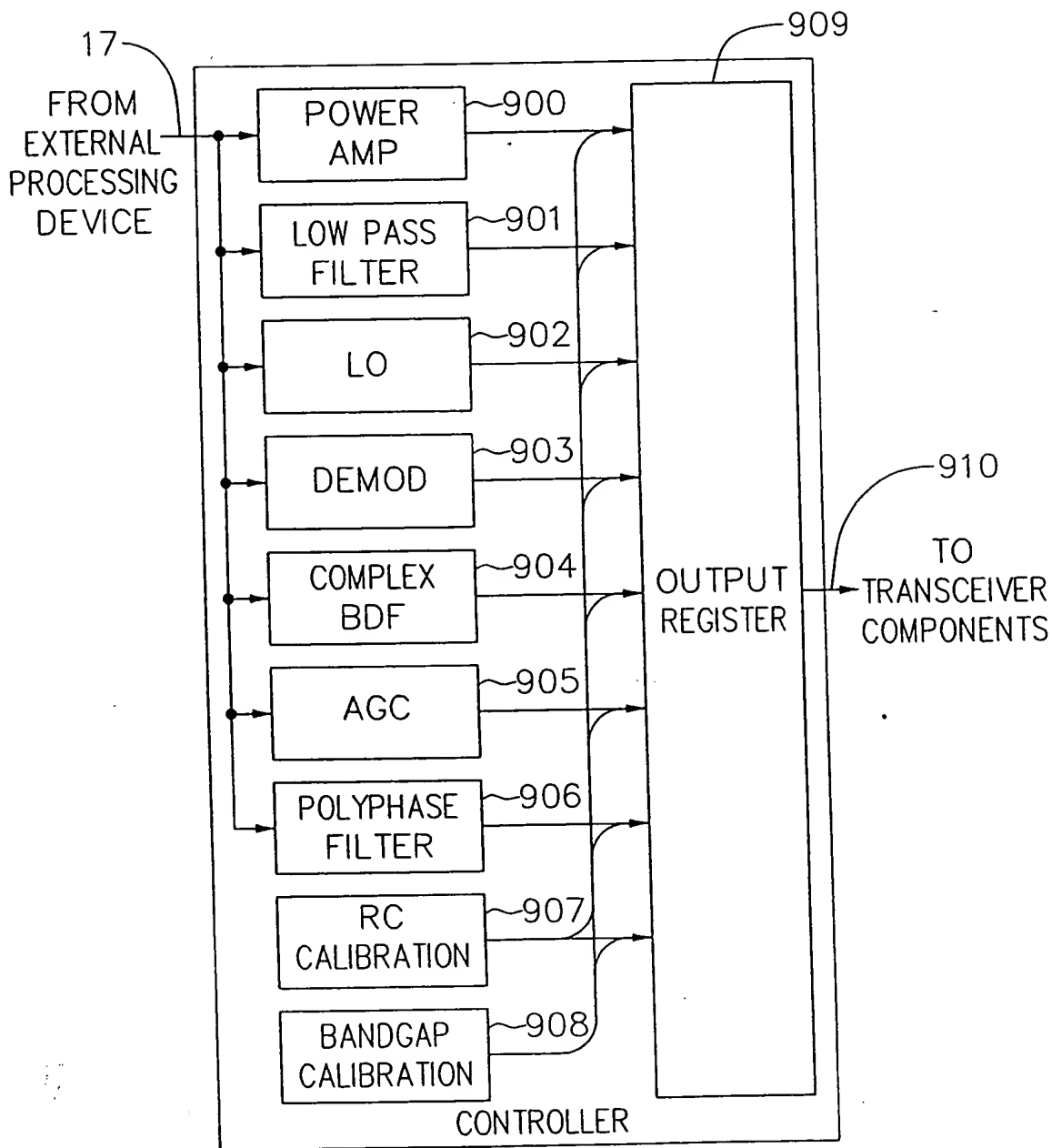




FIG.39

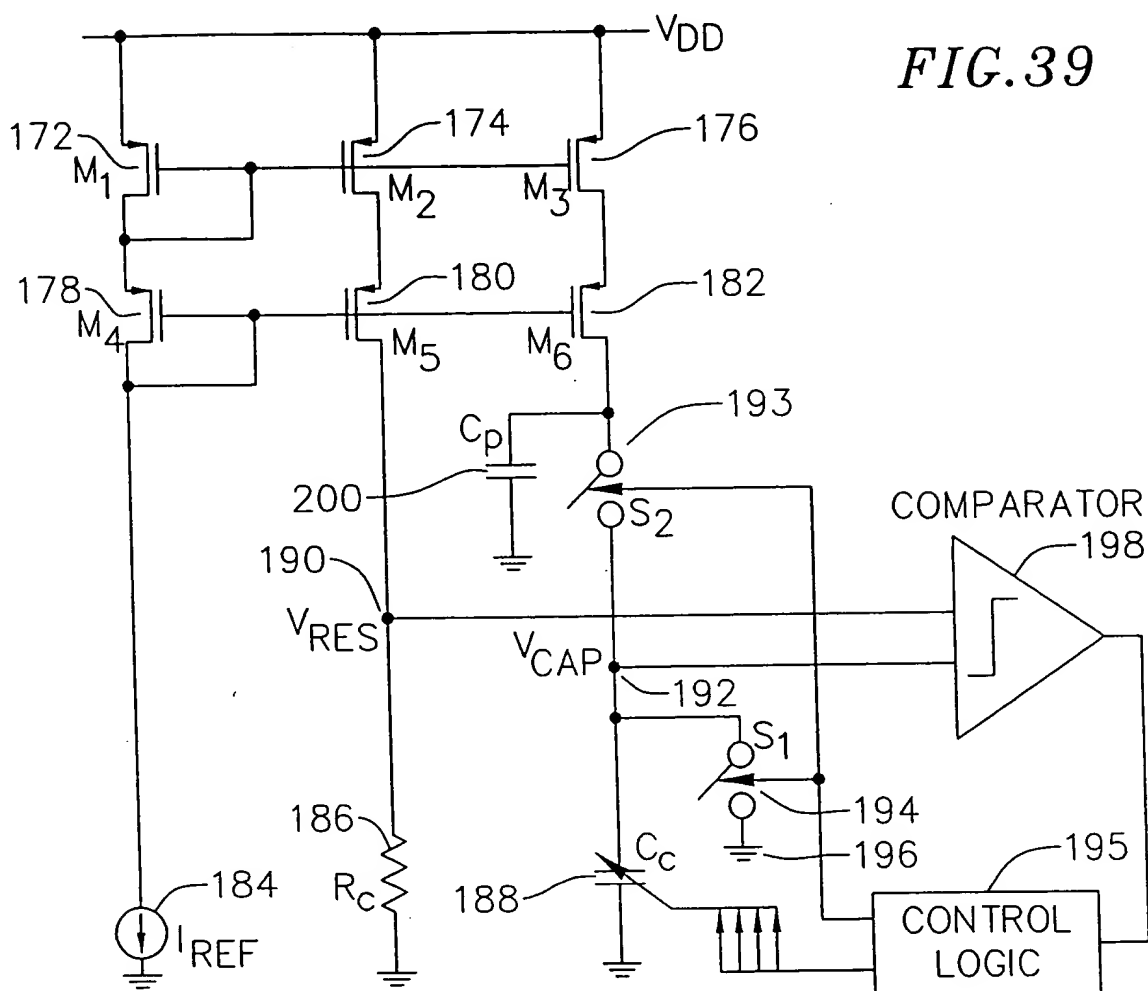
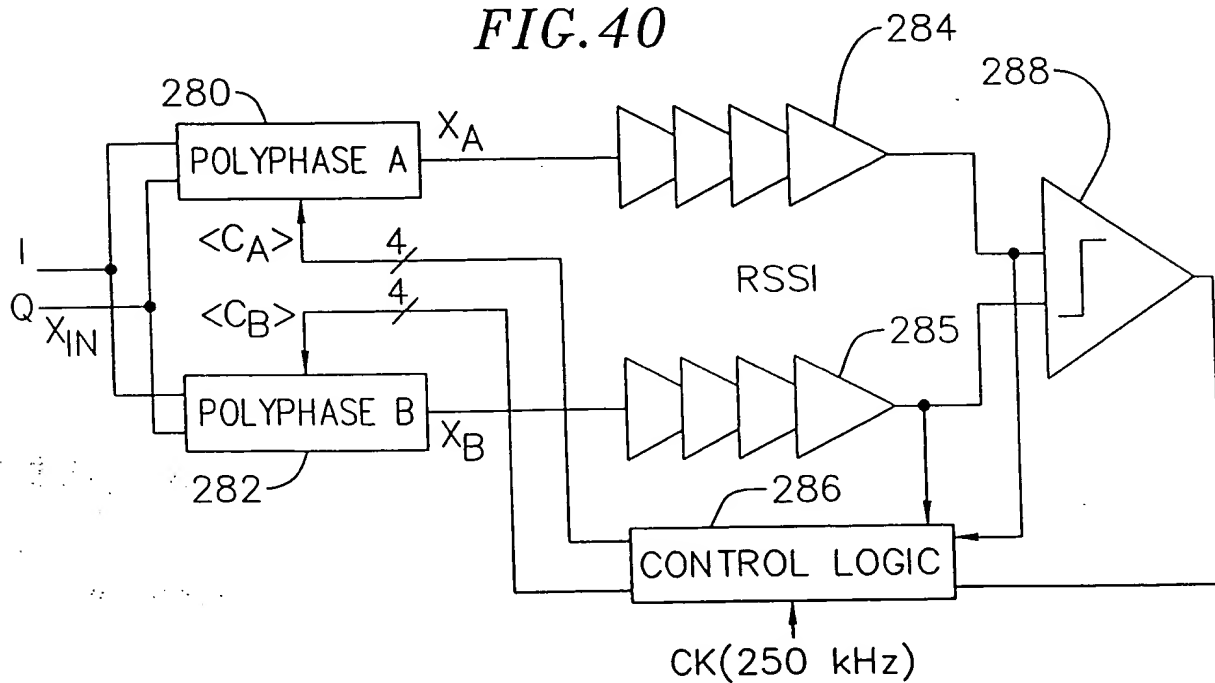
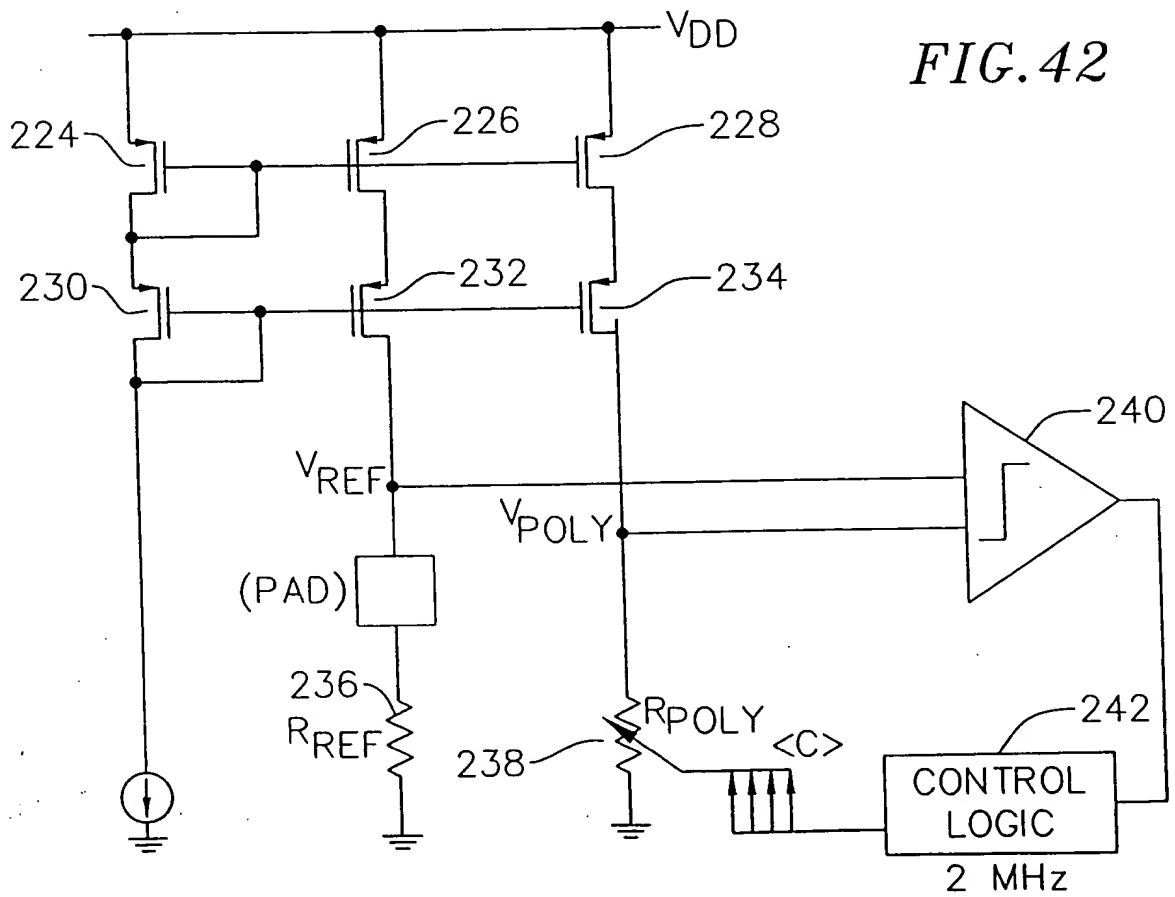
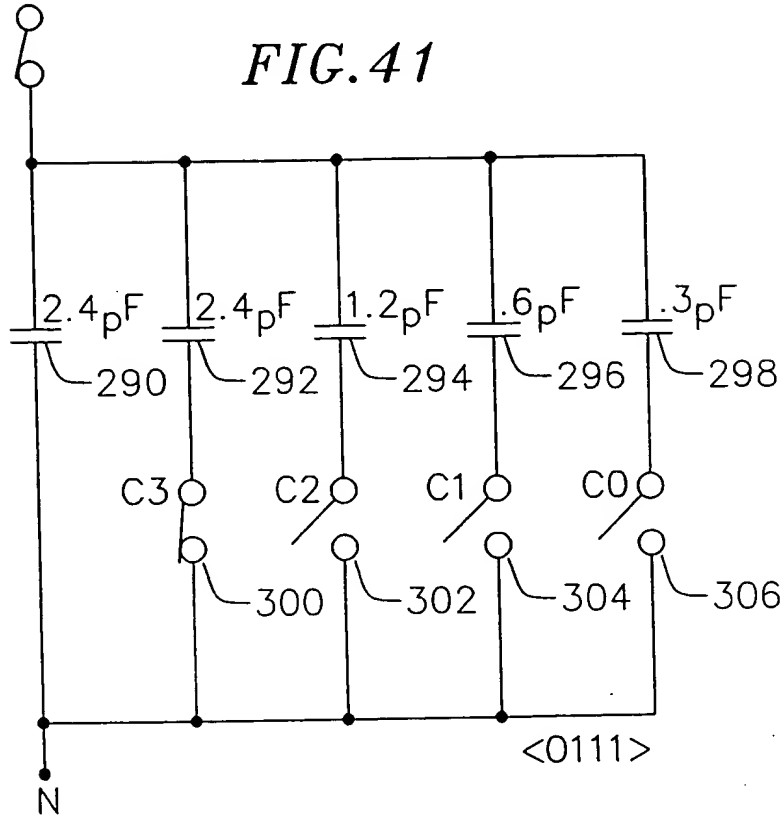


FIG.40







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FIG. 43

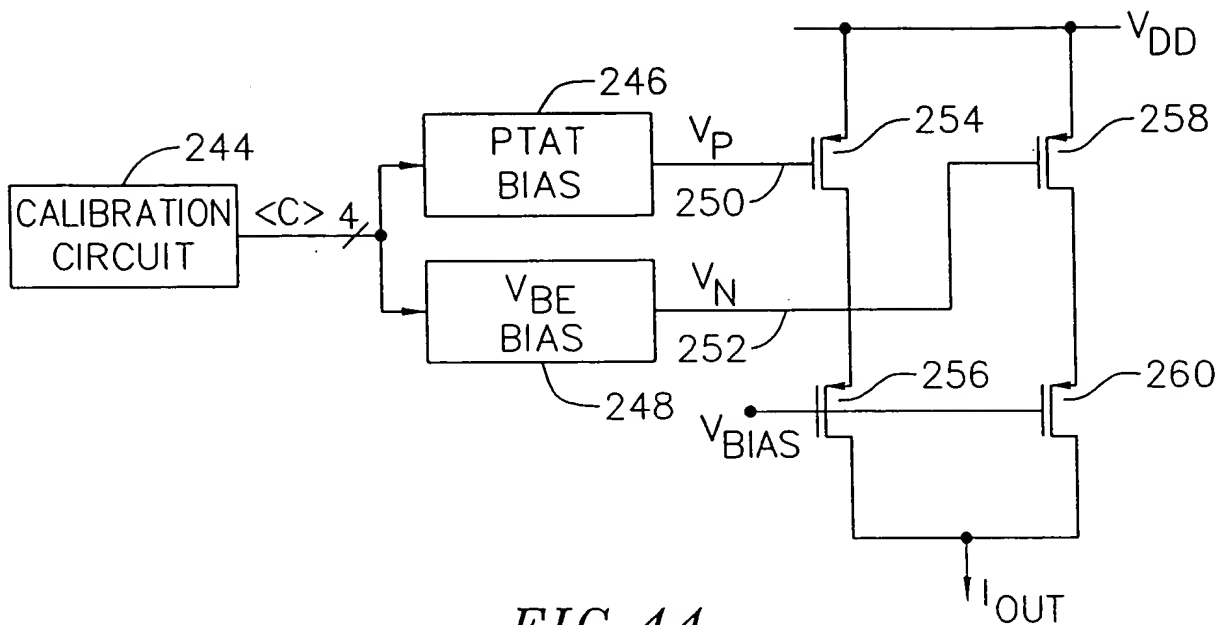


FIG. 44

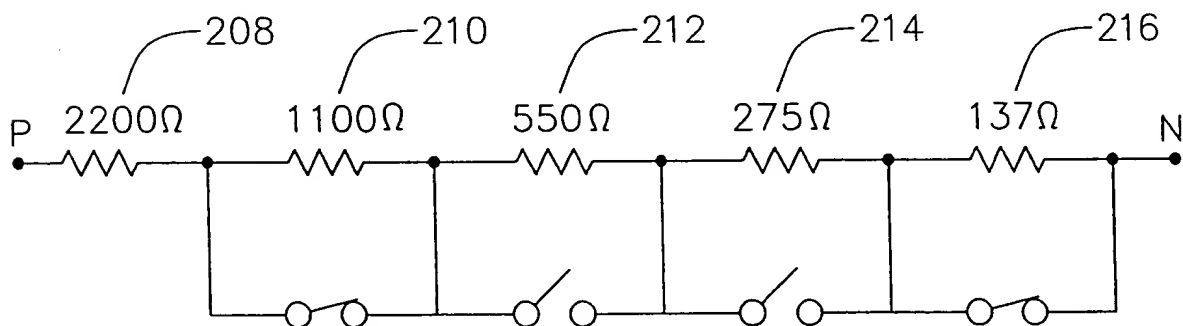


FIG. 45

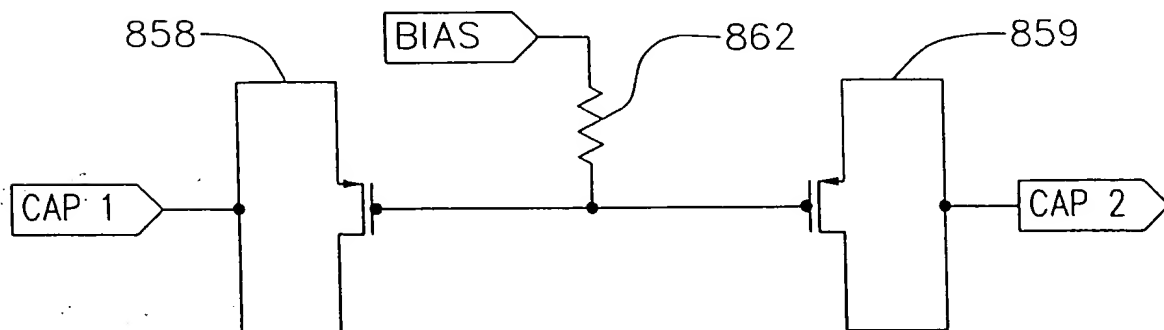




FIG. 46

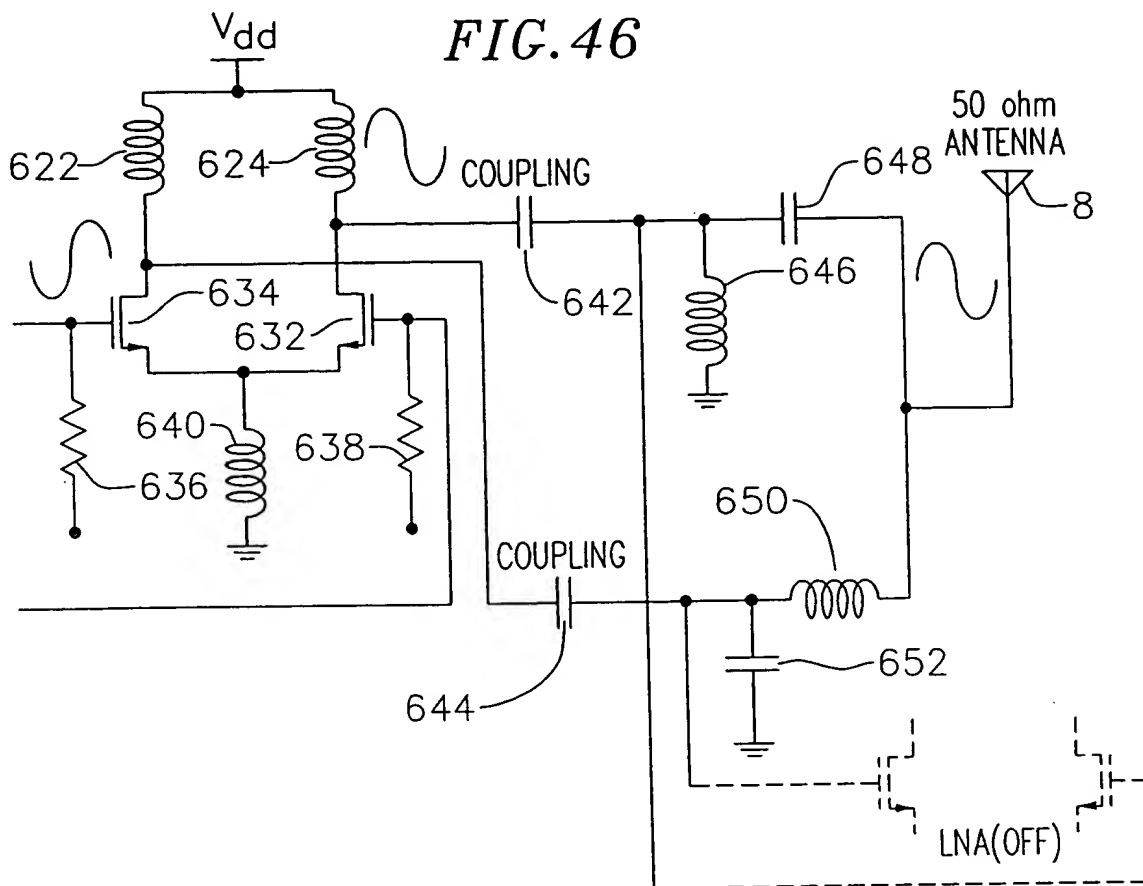


FIG. 47

